testine is satisfactory evidence that it was not present.

I obtained bacillus *x* in a certain number of cases from the contents of the intestines of yellow-fever cadavers; but it was present in comparatively small numbers, and I was more successful in obtaining it by inoculation experiments in guinea-pigs than in cultures made directly from material from the intestine. I suggest in my report that possibly yellow fever results from the absorption of a toxin produced during the multiplication of the specific germ in the alimentary canal. This, however, is only advanced as a hypothesis, which has some facts in its favor. If, as stated by Sanarelli, comparatively small quantities of a filtered culture of this bacillus will give rise to yellow fever in man when injected beneath the skin or directly into the circulation, this fact would appear to give additional value to the hypothesis. At all events, I think it would be very unfortunate if, upon the strength of Sanarelli's negative researches, sanitarians should neglect to disinfect the excreta of yellow-fever patients.

The fact that both Sanarelli and myself have failed in a majority of the cases studied to obtain this bacillus in cultures from the liver, the spleen, and other organs, or in thin sections made from portions of these organs preserved in alcohol, does not absolutely prove that the bacillus was not present in these cases. A few scattered colonies might easily escape observation, even in the most painstaking research, just as a few bacilli present in the intestinal contents might not be discovered by a competent bacteriologist after a protracted investigation by the plate method. The isolation of a non-liquefying bacillus is especially difficult on account of the presence of the colon bacillus in large numbers. If, for example, bacillus *x* was present in the proportion of 1–1000 of other non-liquefying bacilli, there would be but little chance of finding it by the use of plate-cultures.

All bacteriologists recognize the difficulty of isolating the typhoid bacillus from the dejecta of typhoid patients, and Gaffky has shown that in fatal cases in which the presence of colonies was not detected in the sections of the spleen, or in which such colonies were extremely rare, the bacillus could always be obtained by means of cultures. I had this fact in view in my researches made at Havana, and habitually introduced a considerable amount of material from the interior of the liver and of blood from one of the cavities of the heart into the various culture-media used in my investigations. I admit that a negative result does not prove the absence of bacteria capable of developing in these culture-media. Indeed, I obtained proof that the contrary is the case; for I invariably obtained various bacteria from cultures made from portions of liver or kidney preserved forty-eight hours in an antiseptic wrapping. Some of these were well-known bacilli, such as the colon bacillus, bacillus proteus vulgaris, and large anaerobic bacilli. Associated with these was bacillus *x*.

It is evident, then, that notwithstanding the negative results usually attending culture-experiments with blood from the heart or material from the interior of one of the organs principally affected, bacteria of different species were present in the liver and kidney in small numbers, and that they developed abundantly *post-mortem* when portions of these organs enveloped in an antiseptic wrapping were placed in an incubating-oven. This method was followed by Sanarelli, but he neglects to make any reference to the fact that I had employed it in an extended series of cases, or to my bacillus *x*, which is fully described in my official report, to which he apparently had access, although he makes serious mistakes in referring to my work. Thus, he says: "Dr. Sternberg of Baltimore, author of the most recent, the most rich, and the most methodical contribution to this disease known up to present time, declares that the specific microbe of yellow fever is yet to be found, and he affirms that the whole question is to be taken up *ab initio*."

This was not exactly my position, as witness the following quotation from the introduction to my report: "I have now commenced writing a report because I feel that an account of what I have been doing during the past two years is due, and not because I have brought my investigation to a successful termination, or because I feel that there is nothing more to be done.

"No one can regret more than I do that the question of the etiology of yellow fever is not yet solved in a definite manner, but I at least have not to reproach myself with want of diligence or failure to embrace every opportunity for pursuing the research. The difficulties have proved to be much greater than I anticipated at the outset. If the task before me had been to find an organism in the blood, like that of relapsing fever, or of anthrax, or an organism in the organs principally involved, as in typhoid fever, or leprosy, or glanders, or in the intestine, as in cholera, the researches I have made could scarcely have failed to be crowned with success. But this has not proved to be the case, and among the micro-organisms encountered there is not one which by its constant presence and special pathogenic power can be indisputably shown to be the specific agent in this disease."

Note that I say "among the micro-organisms encountered there is not one which by its constant presence and special pathogenic power can be shown

indisputably to be the specific infectious agent in this disease." But, as heretofore stated, I carefully described one particular bacillus, and in summarizing my results said: "It is possible that this bacillus is concerned in the etiology of yellow fever." Evidently it was my intention that subsequent investigators should consider this possibility, and if my work was well done, by approved methods, no one has a right to ignore it, and continued investigations by the same method cannot be considered as taking up the question *ab initio*.

Again, Sanarelli says: "Sternberg thinks that there is probably a localized infection having its principal seat in the *stomach*." This is a mistake. I have advanced the hypothesis that the germ of yellow fever may perhaps be located in the alimentary canal, as is the case in cholera, and that the symptoms result from the absorption of a very potent toxin produced by it. But this is only a suggestion, and I know of no evidence indicating that there is a localized infection of the stomach. I have carefully studied many stained sections of the walls of the stomach, and have never found any evidence of a localized infectious process, although "in a certain proportion of the cases there is evidence of inflammation, as shown by the presence of an unusual number of leucocytes in the submucous coat."

I say in my report: "The mucous membrane of the stomach is always found to be more or less hyperemic; the congestion commonly is not general, but is confined to smaller or larger spots or districts, in which it is observed to proceed from one or more centers. From these centers it extends or radiates in a lesser degree, either gradually to be lost or to pass over to another congested district. It is owing to this peculiarity of the congestion that it presents no uniformity of character, but is observed to spread irregularly over larger or smaller portions of the membrane (Schmidt).

"The small intestine commonly contains more or less black matter, either fluid and resembling that found in the stomach, or mixed with mucus and smeared over the mucous coating, especially of the ileum. This, no doubt, comes partly from the stomach, but in other cases is due to passive hemorrhage from the mucous membrane of the intestine itself. This membrane presents arborescent patches of congestion, or portions of the canal may be uniformly red from hyperemia of the mucous coat; the color varies from pale red to a reddish brown, and is usually more marked in the lower portion of the ileum than elsewhere. The large intestine occasionally presents similar arborescent patches of congestion, but it usually has a normal appearance. Finally, we may say that the attention of pathologists has heretofore been so largely taken up with the pathologic histology of the organs which present the most notable changes—liver and kidney—that the histology of the alimentary canal has been somewhat neglected, and further researches in this direction are desirable upon material obtained at the earliest possible moment after death."

If we admit the specific character of the bacillus under consideration, I think we must await further investigations before the question can be considered as definitely settled as to the locality in which it establishes itself in the body of an infected individual —whether in the organs involved, as claimed by Sanarelli, or in the alimentary canal, as suggested by me. But the most important question at present relates to the supposed specific character of this bacillus.

Experiments are now being made under my direction both with bacillus *x* and with cultures of the bacillus of Sanarelli, which I obtained through the courtesy of Dr. Roux during a recent visit to Paris. While I am not likely to have an opportunity to make experiments on man, I hope to make a careful comparative study of the pathogenic action upon dogs and guinea-pigs of bacillus *x* and the bacillus icteroides of Sanarelli. If identity is established and Sanarelli's results are confirmed, I shall be ready to accept this as the specific infectious agent in the disease under consideration. I desire to express my obligations to Dr. Ezra B. Wilson of the Hoagland Laboratory, Brooklyn, N. Y., for having renewed at regular intervals the cultures of bacillus *x* which I left in that laboratory more than four years ago. I myself maintained the cultures after leaving Baltimore for duty at San Francisco during 1890, until they were placed in the Hoagland Laboratory in 1892.

Serum Therapy.—The writer has long been of the opinion that the discovery of the germ of yellow fever would be likely to be followed by important practical results in prophylaxis and in the treatment of the disease. There was nothing irrational in Freire's method of inoculation but, unfortunately, he did not have at his command cultures of the specific infectious agent, and his statistics are entirely unreliable, as shown in my published report.

It is possible that the bacillus of Sternberg and Sanarelli may have been present in some of his impure cultures, before his visit to France, where these cultures were "plated" by Gibier (1887); but the micrococcus which he declared to be his "crytococcus xanthogenicus" and upon his return from Paris presented to me as his yellow-fever germ, was the well-known and very common staphylococcus albus. Inoculations made by him in my presence in four in-

dividuals resulted only in a slight tumefaction and redness at the point of inoculation without any noticeable febrile reaction.

My own researches and those of Sanarelli show that yellow fever is not an acute septicemia, as might perhaps be inferred from the symptoms and course of the disease, and the inference, therefore, is suggested that the clinical phenomena and pathologic changes in the organs involved are due to the action of some potent toxin, produced by a specific microorganism which has a more or less localized habitat in the body of an infected individual. This is now known to be the case in diphtheria and in cholera, and the deadly effects of the toxins produced by the diphtheria bacillus and the cholera spirillum may fairly be compared with the specific toxemia which we call yellow fever.

The recent experiments of Sanarelli appear to give substantial support to the inference that yellow fever is in fact a toxemia. Time and space will only permit a brief summary of the experimental results reported. In *Il Policlinico* of August 15, 1897, details are given of the experiments made upon man (five individuals) with filtered cultures of Sanarelli's bacillus icteroides. The amounts injected varied from 2 to 10 c.cm.

CASE I.—A subcutaneous injection of 2 c.cm. of a filtered culture gave rise to a slight febrile reaction, and to some tumefaction at the point of injection.

CASE II.—A subcutaneous injection of 5 c.cm. of a filtered culture caused a painful swelling at the point of injection, loss of appetite, an elevation of temperature reaching 38.6° C. (101.5° F.). A trace of albumin was found in the urine during several successive days. A second injection of 5 c.cm. after an interval of ten days caused an elevation of temperature and a slight tumefaction at the point of inoculation, which quickly disappeared.

CASE III.—The subject received an intravenous injection of 10 c.cm. of a filtered culture. This was followed within fifteen minutes by nausea and vomiting, general agitation, and pain in the lumbar region. Gradually the abdominal region became painful and the slightest pressure with the hands over the abdomen or in the lumbar region caused severe pain. The temperature, which before the injection was 37.1° C. (98.7° F.), rose within two hours to 101.3° F., and within four hours to 104.5° F. The patient complained of severe headache during the night, and continued to vomit. The following morning the temperature was normal; at 4 P.M. it rose to 101.3° F., and there was slight delirium; there was complete gastric intolerance and anuria. The liquid vomit had a pale coffee color, and upon microscopic examination was found to contain red blood-corpuscles and leucocytes; it had an acid reaction. The anuria continued for two days, when a little turbid urine was obtained from the bladder; this was completely coagulated by heat. Delirium, interrupted by brief periods of coma, continued during the second day, after which the patient's condition improved and recovery took place. On the second day the sclerotics had an evident subicteric tint. On the second day an explorative puncture of the liver and kidney was made and some "juice" was obtained through the aspirating-needle. Under the microscope this was found to contain, from the liver, hepatic cells in a profound state of fatty degeneration and, from the kidney, epithelial cells in a state of intense tumefaction and granular degeneration.

CASE IV.—Five cubic centimeters of a filtered culture was injected into the median cephalic vein. In this case also there resulted persistent vomiting, headache, fever, reaching 106.1°F., cephalalgia, muscular pains, diminished urinary secretion containing an abundance of albumin, and afterwards complete anuria, delirium, a subicteric discoloration of the skin and, on the second day, a condition of collapse developed, the pulse being imperceptible. However, the patient gradually rallied from this grave condition and made a good recovery. "Hepatic juice," obtained as in the previous case by aspiration, contained hepatic cells in a condition of "profound fatty degeneration."

CASE V.—An intravenous injection of 2 c.cm. of a filtered culture was made, November 26th, and two days later was followed by a second injection of 7 c.cm. A third dose of 15 c.cm. was given November 30th, and a fourth of 20 c.cm. December 3d. Each injection was followed by a febrile reaction, but this was greater after the first dose of 2 c.cm. than after the last dose of 20 c.cm.; this was also true as regards the other symptoms, thus showing the immunizing effects of the doses first administered. The initial dose gave rise to general malaise, cephalalgia, and a trace of albumin in the urine. After the second dose (7 c.cm.) there was a decided chill followed by fever, cephalalgia, and severe pains in the back and of the joints of the lower extremities. The third dose was also followed by a violent chill and general prostration and by a febrile movement less intense than after the second dose (7 c.cm.). In this patient a subicteric color of the skin, and especially of the conjunctivæ, was also developed. Blood taken from this patient December 9th, thirteen days after the first intravenous injection, gave a transparent serum having a lemon-yellow color. This serum mixed with a recent culture of bacillus icteroides in the proportion of 1:10 caused an arrest of movement and agglutination of the bacilli.

In a subsequent number (September 15th) of *Il Policlinico*, Sanarelli gives a detailed account of his experiments relating to immunity and serotherapy in the disease under consideration. In this paper the statement is made that blood-serum obtained from a yellow-fever cadaver produces, *in vitro*, when added to a culture of bacillus icteroides, the phenomena of arrest of motion and agglutination ("phenomenon of Grüber-Durham"), but the intensity of the reaction varies considerably. This serum injected into animals did not manifest any preventive power as regards the pathogenic action of the bacillus.

Serum obtained by venesection from a yellow-fever convalescent produced "very slowly" the same reaction. The simultaneous injection of this serum and of a culture of the bacillus did not preserve guinea-pigs from death, but when the same dose (2 c.cm.) was injected twenty-four hours before the injection of the culture, death did not result in most of the animals experimented upon—numbers not given. Antidiphtheritic serum, prepared in Dr. Sanarelli's laboratory, very promptly produced the "Grüber-Durham" reaction with bacillus icteroides

and "antityphoid serum" produced it in a partial manner, but normal human blood-serum had no effect. Attempts to immunize guinea-pigs by the injection of filtered cultures were not successful, and rabbits were immunized with great difficulty. Dogs were immunized by a series of inoculations with filtered cultures, first subcutaneously and later intravenously. At the end of two months they were able to withstand small doses of unfiltered cultures injected beneath the skin, and later intravenous injections, but at first these gave rise to vomiting, fever, and debility. It was only at the end of seven to eight months that they were able to withstand full doses of unfiltered cultures.

Horses could not be immunized by subcutaneous injections of cultures of the bacillus because these caused enormous tumefaction followed by ulceration at the point of injection. For the immunization of horses the following method was adopted: Doses of 5 to 10 c.cm. of a filtered culture were first given. These gave rise to a febrile reaction often lasting several days. Small doses of a filtered culture were then injected into a vein. After about two-months' treatment filtered cultures sterilized by ether were employed, and it was only at the end of five to six months that a small dose of an unfiltered culture could be given. The first dose of a living culture caused loss of appetite and a febrile reaction lasting from eight to ten days. The dose was increased by from 5 to 10 c.cm., and repeated at intervals. These experiments show that the immunization of the lower animals against the pathogenic action of this bacillus is attended with great difficulties, and is a tedious process.

At the time of the publication of his paper, Sanarelli had in his possession three dogs which were very well immunized. One of these had received 300 c.cm. of virulent culture in the space of eight months. Blood-serum from this dog caused arrest of motion and agglutination of the bacilli in a fresh culture when added to it in very small quantity. This serum saved eight out of ten rabbits inoculated with lethal doses of an unfiltered culture; but was not successful in saving the lives of inoculated guinea-pigs.

A horse subjected to the experiment received in the course of five months 29 c.cm. of filtered culture, 2640 c.cm. of culture sterilized by ether, and 35 c.cm. of living (unfiltered) culture. Serum from this horse had a "good preventive power for rabbits." To save a rabbit from a lethal dose of a culture of the bacillus it was necessary to administer twenty-four hours in advance of the inoculation about 5 c.cm. of the serum. Subsequently a serum was obtained which was effective in the amount of 0.5 c.cm., and which in the dose of 2 c.cm. injected forty-eight hours after inoculation, was successful in saving rabbits from the lethal effects of a full dose of a recent culture.

The painstaking experiments detailed by Sanarelli are most important and interesting, but it is evident that they must be followed by carefully conducted experiments upon man before we can be assured that his immunizing serum can be used with success in the prevention and treatment of yellow fever. If it proves to have specific therapeutic power we can scarcely doubt that the bacillus used in immunizing the animals from which the serum was obtained is in truth the yellow-fever germ.

Note.—Comparative experiments already made at the Army Medical Museum, by Major Walter Reed, Surgeon United States Army, show certain cultural differences between the bacillus icteroides of Sanarelli and my bacillus *x*. Whether these are simply due to the fact that bacillus *x* has been cultivated for eight years in artificial media, or are to be considered as evidence that we are dealing with two more or less permanent varieties of a single species, or are to be taken as evidence that the bacillus of Sanarelli is specifically distinct from my bacillus *x* can only be determined by further investigations, and especially by comparative experiments relating to the pathogenic power of the cultures obtained by me from yellow-fever cadavers in Cuba, and by Sanarelli from yellow-fever cadavers in Brazil. At present bacillus *x* is non-motile, while Sanarelli's bacillus is actively motile. But in my original cultures, as stated in my published report, bacillus *x* was motile. At present Dr. Reed informs me that the presence of flagellæ may be demonstrated by proper staining methods.

THE ETIOLOGY AND PATHOLOGY OF YELLOW FEVER.[1]

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THE unfortunate circumstances that have called for the present gathering and have revived so much interest and attention in regard to an old enemy—whose existence the present generation had well nigh forgotten, or at least only remembered with indifference—evokes memories which bring us back to a similar occasion during the summer of 1878, when this identical organization called for a general meeting of the profession of this city, with the view of eliciting the opinions of the leading men of that memorable period as to the most effective means of

[1] Abstract of a paper read before the Orleans Parish Medical Society, September 11, 1897, and published in the *New Orleans Med. and Surg. Jour.*, October, 1897.

stifling the pestilence which confronted our people—a visitation which I most fervently pray will not find its parallel in the present outbreak. There are many veterans still among us who were witnesses to that fearful struggle which cost our devoted people over 4600 lives, and some of these are now recognized as Fellows whom we rejoice to welcome and honor in our councils.

I cannot refrain from making an allusion that the present crisis amply justifies. This is related to the fact that since 1879 the germ of yellow fever has never taken root in the city of New Orleans, and this simply because it was never allowed to reach our levees. Not only has the notion that yellow fever is endemic in this country been forever exploded by the immunity we have enjoyed during the past eighteen years, but the evidence furnished by the present outbreak at Ocean Springs is a demonstration in itself of the soundness of the sanitary principles applied at the mouth of the Mississippi River by the authorities for the exclusion of foreign pestilence since 1883.

I have always remembered the pregnant warning uttered long ago by the distinguished Griessinger, to the effect that "a series of years often pass during which yellow fever is scarcely observable in the very places it especially frequents; and this, though there may be no difference in the going and coming of unacclimated strangers. Then there is rejoicing over the presumed disappearance and destruction of the disease, and a triumph of sanitary police over it is claimed." But the experience of New Orleans since 1879, with its total immunity and continuously increasing prosperity, tells us that this is no ephemeral or fictitious triumph, and that the protection which we have enjoyed has not been due to fortuitous circumstances and accidentally favorable conditions, but that it is entirely the result of the efficiency of the preventive measures employed. Therefore, if the modern generation of medical men in this city has been deprived of the opportunity of acquiring a *de visu* experience with the dread *typhus icteroides*, and has not been granted the doubtful honor of an introduction to "Yellow Jack," it is due to the system of maritime sanitation established by the Louisiana State Board of Health at the mouth of the Mississippi; and I mean by this more distinctly the "Holt system" of maritime sanitation. As I mention the name of our honored Fellow, Joseph Holt, I feel that you will all agree with me that at no time is the praise of his splendid work more worthy of repetition than at this moment, when, in the very disaster which threatens us, we are compelled to recognize the triumph of his principles and methods.

I remember very distinctly that during 1877, 1878, 1879, and 1880 the lamented Bemiss taught us that yellow fever was distinctly a microbic disease, and his manner of stating this etiology of yellow fever and the reasons for accepting it from simple *a priori* reasoning was so lucid and impressive that I believe it could not be better stated to-day. His teaching on this subject, which has been preserved in his most interesting contribution on yellow fever in "Pepper's System of Medicine," vol. i (1885), reproduces his presentation of the subject as we were familiar with it in his lectures. In my notes taken after the epidemic of 1878, more fully stated in the article referred to, which appeared during 1885, I find that he said: "The study of the yellow-fever poison after the *objective* method (microscopic, bacteriologic, etc.) has hitherto been unproductive of definite results. But when we turn to a *subjective* method of investigating that toxic agent which causes yellow fever, it is found to possess sufficiently well-marked characteristics to justify practically valuable conclusions." Some of these characteristics or modes of behavior merit notice.

1. The human system is a field of reproduction and multiplication of the yellow-fever poison, and this is sufficiently established by two facts:

a. A person in the incubation stage of yellow-fever intoxication may be divested of all fomites and yet originate other cases after a developed attack.

b. The infection is intensified by the aggregation of the sick.

These propositions are indisputably true.

2. The poison or infection undergoes some change after leaving the human system.

This appears to be susceptible of proof, because communication from person to person is not a common event. When this does apparently occur, there is often very strong reason for belief that the contagion was resident in some fomites connected with the patient's bed or clothing.

3. There are no sustained observations which prove that the yellow-fever poison is ever created *de novo*.

The autochthonous birthplace of the poison is unknown. The suggestion that yellow fever may have been one of the causes of death during the plague of Athens cannot be authoritatively denied.

This is not at all likely to be true, and, furthermore, the most recent investigations by learned Mexican and Spanish scholars prove that, according to Maya manuscripts, a fatal epidemic disease characterized by black vomit and other symptoms of yellow fever ravaged Yucatan and the regions of the Gulf Coast long before invasion of the Spaniards. Thus the American origin of yellow fever, which has been discussed since the days of Humboldt, is fully sustained.[1]

4. Some of those conditions and circumstances which favor or retard the maturation of the yellow-fever poison outside of the human body are quite well understood. Hot, damp weather is most prominent among the cli-

[1] Dr. Carlos Finlay, *Cronica-Medico-Quirurgica* of Havana, May 15, 1897, and *Revista de Ciencias Medicas* of Barcelona, August 10, 1897.

matic conditions which are favorable to the growth of yellow-fever epidemics.

5. A freezing temperature ordinarily destroys the contagion of yellow fever; a high degree of artificial heat produces a similar result. It is highly probable that certain chemic results would also effect its destruction if brought into contact with it.

6. If yellow-fever fomites are hermetically inclosed in situations protected from cold or other agents which are destructive to their infection, vitality may be preserved for an undetermined length of time, and toxic qualities again made manifest when unacclimated persons (*i. e.*, those who have never had the disease) are exposed to it.

7. Yellow-fever poison possesses ponderability. This characteristic is so distinctly marked that it has been frequently termed a "groveling, low-lying poison."

8. It is incapable of being air-borne through any great distance, at least without being deprived of its toxic effect.

9. It is transportable in fomites through great distances, either on sea or land, but as often as its toxic effects are manifested after these transportations they are so uniform as to be promptly recognizable. A great number of different materials in common use may act as carriers of fomites, such as loose wool, cotton, hair, textile fabrics, ship ballast, and merchandise of various descriptions.

10. The preceding facts explain how the disease is spread, and why it is that it follows the lines of travel and commerce, and thus primarily attacks the seaports and towns situated on navigable streams and then follows the railroads to the inland towns.

11. These qualities of the yellow-fever infection taken collectively, and especially its faculty of reproduction (which only living organisms possess) furnish almost conclusive evidence that yellow fever is a germ disease produced by a specific *contagium vivum*.

Professor Bemiss shared in the general belief still sustained by the latest investigations—that "in the dissemination of yellow fever, atmospheric air is the usual medium through which the infection is received in the human system." That the poison gains its entrance chiefly through the respiratory passages is sustained by almost all the evidence which has accumulated to this day. Dr. Bemiss would very effectively impress this upon his classes by the following striking illustration, which I will quote, as it is pertinent to this occasion. The facts were furnished by Dr. Shannon of Ocean Springs, Miss., in a letter to Dr. Bemiss:

> On the 14th of October, 1883, Major J. B. D. died of yellow fever at Ocean Springs. I moved the family at once to a healthy locality, where you saw Miss B., not allowing them to take any article from the room where the husband and father had died. The children applied to me for a lock of their father's hair, which I refused. But the older daughter, now dead, prevailed upon the nurse to give it to her. She placed it in an old envelope which had been torn open at the end, and carefully folded the torn end down, thus practically sealing it, and laid it away among other old letters. Sunday, the 4th of November, at 12.30 P.M., she brought this envelope out upon the gallery and opened it for the first time to examine the lock of hair and show it to her aunt, Miss S., who was visiting her, and upon inhaling the concentrated poison confined in the envelope and emanating from the hair, exclaimed: "Oh, what a peculiar smell." She then handed the envelope to her aunt, Miss S., who, unconscious of danger, also inhaled "the messenger of death" with a similar exclamation, when Mrs. B., who was standing near, reached out her hand for the envelope, but was prevented from getting it by the entreaties of a fretful child to be taken up in arms. This gave time for sufficient reflection, and she admonished the young ladies of the possible danger. The envelope was then carefully folded, and with its fatal contents replaced in the drawer where it had been since the 14th of October. This drawer had been almost daily opened. The following Saturday night, November 10th, at 9 P.M., Miss S. was taken sick with a chill, and Miss B. about 2 A.M., some five hours later, the period of incubation being less than seven days in both cases. No other person handled the fatal envelope or in any way came in contact with it, and there is, after the most careful inquiry, no suspicion of any other source of infection in these two cases. Miss S. died November 14th; Miss B. on November 16th.

This tragic event, that actually occurred in the very place which has been the starting point of our present troubles, may appear somewhat dramatic, but it is vouched for in every detail by Dr. Shannon, and Dr. Bemiss firmly believed in it.

The Essential Cause of Yellow Fever.—The profound impression produced by the epidemic of 1878 naturally led to many discussions as to the origin and cause of yellow fever, and the theories which were then entertained by many, even by some of the most competent in the profession, would now appear to us as being idle and absurd.

The "telluric" or "miasmatic," the "ship origin," the "fecal" and the "glandular" theories of yellow fever which are more or less dependent upon the supposition that the cause of the disease could originate spontaneously or *de novo* in certain places and in the human organism were still currently believed in, though never to the preponderating extent shown in the previous great epidemic of 1867.

That our sanitary authorities were most thoroughly convinced as early as 1878 of the microbic origin of yellow fever is most eloquently attested by the desperate but ineffectual efforts made by the President of the Board of Health, Dr. S. Choppin, to stamp out this disease by the profuse irrigation of the streets of this city with carbolic acid. The dominant theory was, therefore, the germ theory of the disease. All that was lacking was a tangible demonstration of the existence of the germ itself. It was not long before many anxious explorers began to see the coveted prize.

The first announcement of the discovery of a yellow-fever germ was made in 1878 by Dr. Joseph Richardson of Philadelphia. His alleged discovery was based upon the absolutely insufficient basis furnished by the *post-mortem* examination of a few specimens, and upon this slender foundation he labeled the new microbe the *bacillus sanguinis febris flavæ*.

Inspired by the disastrous experience of 1878 and

realizing the necessity of a systematic and careful study of yellow fever in its most prolific nursery—Havana—the United States National Board of Health determined to send a commission of experts to Cuba during the summer of 1879, and to this end selected Dr. Standford E. Chaillé, chairman; Dr. Geo. M. Sternberg (bacteriologist), Dr. John Guiteras (pathologist and histologist), and the late Colonel Hardee of Louisiana, as sanitary engineer. It was my good fortune also to be selected while still an undergraduate and an interne of the Charity Hospital, to accompany the commission as its clerk and interpreter. I shall always remember the three months spent in Cuba in the company of these distinguished gentlemen and indefatigable workers as one of the most important events in my life, as experience and knowledge gathered in the hospitals of Havana, which were crowded with yellow-fever patients, and in the laboratory of the commission, were of immeasurable benefit to me in my subsequent experiences with this disease. It would be impossible and out of place on this occasion to give an account of the results obtained by the labors of the commission. Suffice it to say, that while the researches into the essential cause of the disease were only negative, owing in a great measure to the then rudimentary condition of bacteriologic methods, only the liquid-culture fluids being known and none of the various staining processes for studying bacteria in the tissues having been discovered, still, the indefatigable industry of Dr. Sternberg cleared many points in the histology of the blood which have been of the greatest value in his own subsequent work, as well as in that of other investigators. As to the study of the collateral questions, and especially the sanitary condition of Cuba, which determined the endemicity of the disease in that island, nothing more satisfactory, thorough, or complete has ever been given to the world than the data collated by the chairman, the distinguished dean of our medical department, Dr. Chaillé. I should mention incidentally that among one of the most notable results of this investigation was the fact, brought to light for the first time by Dr. Chaillé, that the immunity enjoyed by native Cubans, and in fact by all natives of endemic *foci* of yellow fever, was not due to the influence of climate, but solely the protection given by a previous attack experienced in early childhood. This explanation of native immunity, which was at first hotly contested in Cuba and elsewhere, is now definitely admitted everywhere, in consequence of the convincing evidence first furnished by Dr. Chaillé, and since by Dr. Guiteras while studying the same question in Key West and Matanzas.

Continuing with the record of the claims of discovery of the yellow-fever germ, we find that after the negative researches of Woodward, Sternberg, and Schmidt, during 1879 and 1880, no discovery was definitely announced until 1881, when Charrin and Capitan believed that they had found a specific micrococcus in specimens of blood brought to Paris by Morand, from Senegal. During 1883, Dr. Lacerda of Rio de Janeiro, having discovered what he believed to be the specific micro-organisms in the liver and kidneys of yellow-fever patients, sent some material to Paris to Dr. Babes. For a time Babes believed that they were the veritable germs of yellow fever, but he subsequently renounced this claim. During 1884–85 Dr. Carmona y Valle of Mexico, in his memoir "Leçons sur l'etiologie et la prophylaxie de la fièvre jaune," described his *peronospora lutea*, a species of mucor, as the specific cause. During 1885, Domingos Freire of Rio de Janeiro, published his principal work, *La Doctrine Microbienne de la Fièvre Jaune*, in which he maintained the specificity of his *cryptococcus xanthogenicus*, and described his prophylactic inoculations and their results. This widely advertised announcement created considerable stir in the professional world, and prompted this government to detail Dr. Sternberg on a special mission of investigation.

The results of this notable inquiry are all embodied in the comprehensive and admirable report on the etiology and prevention of yellow fever published by the United States Marine Hospital Service during 1890, in which Dr. Sternberg completely refutes all the claims maintained by Freire and permanently disposes of the prophylactic value of his alleged vaccine.

The same fate awaited the claims in favor of the *micrococcus tetragenus febres flavæ* or *versatilis* (Sternberg) described by Carlos Finlay and Delgado of Havana, 1887–88, and in a similar manner, the bacillus which Dr. Paul Gibier found in the intestinal canal during 1887 while studying the disease in Havana. In the meantime Dr. Sternberg had been tireless in his investigations; he availed himself of every opportunity to fathom the cause of the disease. Starting with his first experience in Havana during 1879, he visited Rio and Vera Cruz in 1887, where he promptly eliminated the claims of Freire and Carmona; during 1888 he studied the disease again at Decatur, Ala., where the disease was epidemic; finally, during 1888–89 he again visited Havana and applied all the resources of the improved bacteriologic technic which he, above all others, could command. At the conclusion of his labors, which are all summarized in the complete report issued by the United States Marine Hospital Service in 1890, Dr. Sternberg was forced to the conclusion that the specific agent in yellow fever had not been demonstrated. Nevertheless, he emphasized the point that "among the facultative

anaerobics is one—my bacillus *x*—which has been isolated by the culture method in a considerable number of cases, and may have been present in all. This bacillus has not been encountered in the comparative experiments made. It is very pathogenic for rabbits when injected into the cavity of the abdomen. It is possible that this bacillus is concerned in the etiology of yellow fever, etc." Here Dr. Sternberg rested. His laborious work had only succeeded in conclusively demonstrating that all the alleged discoveries previously made were fictitious, and the riddle of yellow fever remained as practically unsolved as ever. In this critical work, which swept away so many accumulations of bacteriologic rubbish, Sternberg's conclusions were most ably confirmed and supported by the conscientious researches of Heineman of Vera Cruz, who, in a valuable paper contributed to *Virchow's Archives*, 1888, also effectually disposed of the claims of Freire, Carmona, Gibier, and their followers.

It thus became evident that the germ of yellow fever was no common organism. If not imaginary, it certainly was endowed with the most elusive properties. It could surely be said of this microbe that the frequency with which it was seen was inversely proportionate to the skill and experience of the observer. There was reason for discouragement, but, nevertheless, it was evident in Sternberg's interesting study of his bacillus that there was yet hope that with more time, opportunity, and improved methods the cunning culprit would at last be tracked and captured.

Such was the state of the professional mind when suddenly, after a silence of seven years, the bacteriologic horizon was illuminated by the almost simultaneous announcement of the discovery of the long-sought germ by Professor Guiseppe Sanarelli, the director of the Institute of Hygiene of Montevideo, Uruguay, and by Dr. W. Havelberg, a bacteriologist of Rio de Janeiro.

These announcements are regarded as of great importance, far in both instances they were made by men of acknowledged reputation and ability in the latest methods of bacteriologic research. According to the Roman correspondent of the *British Medical Journal* (February 23, 1897) Sanarelli is regarded as one of the most accomplished bacteriologists of the profession. "He is thirty-five years of age. His opportunities have been exceptionally fine. A graduate of Sienna, he continued his studies in experimental hygiene under Celli at Rome, Roux in Paris, and Behring in Berlin. In 1893 he received the appointment as Director of the Institute of Hygiene of Montevideo. During the summer of 1896 he went to the Island of Flores, where yellow fever was severely prevalent. There he performed a number of necropsies, and was himself smitten with the disease. As soon as he recovered he resumed his investigations at Rio de Janeiro, where the disease was raging. Here at the end of two months of assiduous labor, his efforts were rewarded. For some time he was loath to give publicity to the fact that the specific microbe had been discovered. But at length he became so well convinced that he had in hand the yellow-fever microbe that he commenced in August the preparation of his serum-cultures. He encountered many obstacles, but these were finally overcome and he was able to state that "the microbe of yellow fever now splendidly presents itself, and is the strangest of all the microbes that are known."

On the other hand, the fact that Dr. Havelberg's report was first published in the *Annales de l'Institut Pasteur*, and that some of his work was done at the suggestion of M. Roux, would seem to indicate that he also has strong backing, and that we are likely to have a lively scientific tilt over the affair.

The most regrettable feature of the situation is that the respective microbes discovered by these men possess few, if any, traits in common, and are found in a different manner and in different parts of the body, so that there is in consequence decided antagonism between the respective claims.

According to Sanarelli the isolation of the specific microbe of yellow fever is only possible in fifty-eight per cent. of the cases, *and in some rare cases* may be effected during life. The reasons why in every case of yellow fever one cannot isolate the specific agent are easy to understand. In the first place, at the beginning of the disease the bacillus icteroides multiplies very little in the human organism, a small quantity of the toxin, as we shall see later, being quite sufficient to develop in man the very grave picture of the complete disease. In the second place, the toxin, either by itself or indirectly by means of the profound lesions which it determines, above all in the digestive mucosa and in the liver, facilitates in an exceptional way secondary infections of every kind. Such special infections may sometimes assume the type of true and special septicemiæ, with colon bacilli, streptococci, staphylococci, etc., capable of killing the patient by themselves alone. At other times they occur mixed, so that in the last stages of life they may transform the individual into a true culture of almost all the intestinal microbic species.

The bacillus at first sight presents nothing morphologically characteristic. It is a little bacillus with rounded extremities, for the most part united in pairs, in cultures, and in small groups in the tissues, from two- to four-thousandths of a millimeter in

length, and, as a rule, two or three times longer than broad. It is very polymorphous. A search for it in the tissues does not give good results, excepting in the cases in which the death of a patient occurs without secondary septicemia. Even in the cases which on bacteriologic examination give the purest results, it is not easy to see it in the section of the tissues, owing to the number being sometimes extremely small. Yet by employing suitable methods one can find it in the organs, usually united in little groups, *always situated* in the *small capillaries* of the liver, kidneys, stomach, etc. The best method for demonstrating not only its presence, but also the special tendency it has to be localized in small groups in the blood-capillaries, is to place a small fragment of liver, obtained from the body while fresh, in the incubator at 37° C. during twelve hours; this favors the multiplication of the specific microbes. Sanarelli's germ is stained readily by basic anilin dyes, but is decolorized by Gram's method. When stained by suitable media it is found to possess four to eight lateral cilia. It grows readily in all ordinary media above 20° C., the maximum temperature being 37° C. It does not liquefy gelatin, neither does it cause precipitation in meat broth, nor does it curdle milk. The most important diagnostic feature, however, is supplied by the colonies on the surface of agar when incubated for twelve hours at 37° C., and then allowed to develop further at room temperatures. The colonies, when incubated, appear merely as semitransparent round disks, but during subsequent growth at the room temperature a thick, opaque, white border forms around each colony, giving a very characteristic appearance, resembling a drop of sealing-wax. As their character fortunately may be determined within twenty-four hours, it serves to establish in the most rapid and certain manner the bacteriologic diagnosis of the fever. This statement is alone, if confirmed, of the greatest importance from a sanitary point of view. Taken with the possibility of obtaining a pathognomonic serum-reaction with typical cultures, just as is now done with Widal's test in typhoid fever, we at once grasp its full and enormous significance in dealing with the early and doubtful stages of yellow-fever epidemics. Should this test be available, we would not be compelled to wait for *post-mortems* to clear up a diagnosis, and the long hesitation and unseemly discussions which characterize medical consultations among official experts in non-typical cases would be promptly disposed of; neither would there be any likelihood of an entire country being infected while waiting for the percentage of mortality to decide as to whether the disease is yellow fever, dengue, or something else.

Causes of Death in Yellow Fever.—The patient suffering from yellow fever is in fact contemporaneously threatened by three imminent dangers, and the bacteriologic examination of the cadaver may approximately place the following in evidence as the principal causes of death:

1. It may be due to the specific infection, principally, when the bacillus icteroides is found in the cadaver in a certain quantity and in a relative state of purity. This happens only in the cases which run their special disease cycle to the end.

2. It may be due to septicemiæ successively established during the course of the disease, when the cadaver presents almost a pure culture of other microbes.

3. It may also be due in great part to renal insufficiency, when the cadaver is found almost sterile; the percentage of urea in the blood is very high, and death takes place before the malady has reached the end of the evolutionary cycle.

It is difficult to pronounce during the life of the patient on the prevalence or not of uremic symptoms over the specific, because the most salient symptoms of the yellow-fever intoxication are easily confounded with those of renal insufficiency.

The so-called "black vomit" is due to the action of the gastric acidity on the blood which is extravasated into the stomach in consequence of the grave toxic lesions of its mucosa. The act of vomiting is directly provoked by the specific emetic action which the toxic products of the bacillus circulating in the blood possess.

The hemorrhagic symptoms are due above all to the hemorrhage-producing (hemolytic) property possessed by the bacillus icteroides in common with other microbes, and, in the second place, to the profound and rapid fatty degeneration produced in the vessel walls.

The Specific Toxin.—The small numbers in which the bacillus icteroides are usually found in the human organism, and the violence of the symptoms which are immediately produced in dogs by injections of small cultures into the veins indicate the existence of a very active specific poison. This poison or toxin is obtained, like that of diphtheria, by simply filtering through porcelain the broth-cultures of the bacillus about twenty-four days old. The toxin bears heating to 70° C. (158° F.) almost with impunity, but boiling notably attenuates it. If cultures sterilized with ether are employed, the toxic power is much more active.

All the sympathetic phenomena, all the functional alterations, all the anatomic lesions which individualize and give the yellow-fever picture its wonderfully striking outlines are only the consequence of

an eminently steatogenic (or fat transforming), emetic, pyrogenic, hemolytic, and extraordinarily active toxin, elaborated by a germ which, for convenience, is called by its discoverer the *bacillus icteroides*. It is no doubt in consequence of these effects that yellow fever has been aptly compared to poisoning by the venom of certain serpents. Surely no one will deny, no matter what doubts he may entertain of the identity of Sanarelli's germ with the cause, if he has had any practical acquaintance with yellow fever, that no explanation has ever been offered more satisfactory to our pathologic and clinical sense, and that will better account for the train of symptoms which identify this disease—fever, vomiting, hemorrhages, albuminuria, anuria, fatty degenerations of liver, kidneys, and heart—than the effects of the toxin so clearly and impressively described by Sanarelli.

Now as to the mechanism of infection. By what avenue does this terrible germ enter into the organism, and where, or in what special tissues, does it establish its toxin factory? The first of these is a question of the greatest practical importance. We see that it produces its effects most rapidly when injected into the blood by intravenous or subcutaneous injection. But the normal or common way by which it gains entrance in epidemic conditions is not so clearly understood. It is evident that the *atrium* or gateway of infection must be by either of two ways —the respiratory or the alimentary passages. Sanarelli believes that it may be by both routes, but in accordance with clinical experiment and common observation, he lays stress upon the former route as by far the most frequent of the two.

The remarkable resistance to drying which Sanarelli has demonstrated in the bacillus icteroides warrants the assumption that this germ may be conveyed in the air as well as in water. Further, "contagion by the respiratory passages has been demonstrated to be possible by experiments on animals." As to the mechanism of contagion by water, milk, or other ingesta, it is difficult to understand it in healthy subjects, as it is now placed beyond a doubt that the epithelium of the digestive passages, when it is intact, does not, as a rule, permit the passage of any pathogenic germs. But in tropical countries the liver, especially of foreigners, is usually overtaxed, and it is possible to conceive that, owing to the weakness of this most important barrier against intestinal infection, the germ may gain an entrance into the circulation.

At any rate, the morbid process is clearly understood once the germ is admitted into the organism. Whether introduced by the nasal chambers, the fauces, tonsils, or lungs, or by the alimentary tract, it is carried by the circulation to the capillary system of the liver, spleen, gastro-intestinal canal or kidneys, which are its preferred habitats. Here the germ develops slowly, for, like most potent microbes, its reproductive capacity is limited; in fact, five to eight days will be needed to form colonies which are so small that it will require the most skilful detective work with the microscope to discover them. While reproducing itself, however, it begins to manufacture its terrible toxin. This toxico-genetic function probably begins from the moment that the germ becomes fixed as a capillary embolus and when colonization begins. Its colonies are fully matured in the laboratory—outside of the tissues—in twelve to twenty-four hours. The dose and toxicity of the poison will no doubt depend upon the size and activity of the colonies. And here the vigor or weakness of the individual defenses of the host—phagocytic and humoral, will largely determine the future progress of the parasitic colony. The questions of the relative predisposition and immunity must largely decide whether the attack will be severe or mild. Certainly the effect of the first discharge of the poison into the blood stream is pyrogenic, then follows the emetic action probably on the nerve centers, then simultaneously begins the attack on the great bulwarks of defense—the liver, capillaries of the alimentary tract, the kidneys, and, lastly, the heart-muscle and the blood itself. Then the real danger begins—when these viscera and especially when the liver and kidneys are undergoing fatty change—then a gateway is at once opened for the admission of all the intestinal germs and their toxins into the blood, and by the destruction of the renal epithelium the great outlets by which they are to be carried out are plugged and auto-intoxication is inevitable. In the carnival of destruction which follows, the original parasitic host may itself be destroyed by the swarm of greedy guests that it has blindly admitted to its own banquet.

This account of the pathology of yellow fever may appear somewhat figurative and metaphoric, but it is, nevertheless, that which most clearly explains the phenomena of this remarkable disease.

We will now close by asking ourselves what is the practical outcome of all these researches—what bearing has Sanarelli's discovery to the prophylaxis, diagnosis, and treatment of yellow fever, if verified?

1. *Prophylaxis.*—It is legitimate to expect that in dealing with so specific and potent a microorganism as the bacillus icteroides, it is possible, by attentuated culture or by an antitoxic serum, such as is now obtained from immunized horses after subjecting them to experimental diphtheria or tetanus, that

a reliable preventive and curative agent will be obtained.

2. *Diagnosis.*—That if the cultures obtained from the bacillus icteroides are specifically characteristic, as claimed by Sanarelli, a pathognomonic culture may be obtained in twenty-four hours from suspected cases. Again, if this should be impracticable during life, owing to the paucity of germs in the blood, it is possible that a specific serum reaction, similar to Widal's agglutination test, may be obtained, which will permit of an immediate and infallible diagnosis in the early stages of the disease. The enormous value of such a test to the sanitarian need only be mentioned to be appreciated.

3. *Treatment.*—Of course, the greatest value of Sanarelli's researches lies in the prospect of obtaining a specific antitoxin which alone can cope with the specific cause in the blood and the tissues. Apart from this, these researches would suggest some important conclusions which affect our present mode of treatment.

(*a*) That no hope of aborting or arresting the disease can be entertained by resorting to germicidal medication with the view of destroying the specific micro-organisms in the gastro-intestinal tract. When the symptoms of yellow fever present themselves, the specific germ and its toxins are already in the blood and tissues, and no amount of purgation or gastro-intestinal antisepsis could possibly affect its future course or development. This explains why all the emeto-cathartic remedies and antiseptic treatments have totally failed, either in the past or present, to control or abort the course of the disease.

(*b*) On the other hand, in view of the secondary infections, which so frequently complicate this disease by the invasion of the colon bacillus, staphylococci, streptococci, and other bacteria of the gastro-intestinal tract in the graver types of this infection, it is perfectly logical and proper to resort to laxatives and intestinal antiseptics and a total abstinence from all foods, with the view of diminishing these secondary intoxications to the minimum. In this way proper treatment may modify the course of the disease by diminishing the perils of its latest stages.

(*c*) At all times it should be borne in mind that, while attempting to secure the most complete asepsis of the gastro-intestinal tract, no violent drastics or germicidal agents should be resorted to, as the lesions of the mucosa produced by such agents would favor the very conditions which they are intended to prevent. For these reasons a mild triturate tablet of calomel and soda (aa gr. 1), followed by a saline draught, any of the purgative mineral waters, etc., given at the outset, will suffice. Then the most important means of maintaining gastro-intestinal asepsis will be total fasting or abstinence from food until the latter stages, when fruit juices, hot or iced tea, champagne, and, lastly, peptonized milk, if the patient is convalescent, may be given with discretion.

One of the fundamental and pernicious errors in this disease is the belief that food is necessary in its treatment, because it is a prostrating disease. This is not a wasting disease, and when it is *typical* it is self-limited and of comparatively short duration. In this way it differs radically from typhoid. The cry of the organism is not for food, which will only help to clog up all the machinery of elimination, but for water, *water* which is needed from the very beginning, to dilute the toxins in the blood, to maintain the secretions of the poisoned organs, the skin, and, above all, to flush out the kidneys, which are blocked up so early in the struggle. Later on, when adynamic symptoms present themselves, stimulants may be given in moderation, and food of the most assimilable sort, and this only when convalescence has begun or secondary septicemiæ of long duration have set in. These are the cardinal principles which would guide my treatment in the present, and are essentially those that I have followed in the past. In no condition have I taken to heart more seriously the motto "*Primum non nocere*," and if my inexperienced junior friends will only remember this caution, even to the exclusion of all else I have said, I will feel that I have accomplished some good to-night.

THE TREATMENT OF YELLOW FEVER.[1]

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THE treatment of yellow fever may be divided into (*a*) the hygienic, (*b*) the dietetic, (*c*) the therapeutic, and (*d*) the surgical. Pending the investigations being made by bacteriologists all over the world into the claims of the latest aspirant, Sanarelli, to the honor of having discovered the *vera causa* of yellow fever, the bacillus which has for ten years eluded Sternberg, which has successively baffled the brilliant Gibier, Carmona y Valle, Freire, and Finlay, and which he has named bacillus icteroides, we must fall back upon that line of treatment which, though possibly based upon false etiologic grounds, yet yields the best results, and, at all events, one which seems to meet plain and specific indications. Perhaps it would not be out of place to review briefly the line of treatment pursued here in the past. A brisk purgative; hot mustard foot-bath; patient covered with one or more blankets to promote profuse diaphoresis; hot orange-leaf tea *ad libitum*, and,

[1] Abstract of a paper read before the Orleans Parish Medical Society and published in *New Orleans Med and Surg. Jour.*, October, 1897.

at times, in the beginning an emetic; absolute interdiction of cold drinks, though cracked ice was allowed in small quantities for nausea. Spirits of nitre, or watermelon-seed tea, and some such diaphoretic as spirits of Mindererus, coupled with a four-days' fast, about completed the treatment up to the defervescence of the fever. Dry and wet cups and leeches were often used—the main reliance, however, was in sweating and starving the fever out. The results obtained by this method in simple and uncomplicated cases were most excellent, and were often better than those in which a more vigorous treatment was pursued.

The reasons for this success are not hard to find: (1) most patients with uncomplicated yellow fever tend to recover; (2) it usually did no harm, and (3) the great faith of the Creole nurses in its efficacy, by a species of hypnosis, gave much encouragement to the patient, thereby greatly facilitating his recovery. This treatment practically is the same as that pursued to-day by the Cuban peons, many of whom boldly assert that only those Cubans die who are treated by doctors. Thus it will be seen that this disease, if not over-treated, tends to recovery. The main indications being *Rest* in the horizontal position, a spare diet, perfect quiet, plenty of fresh air, gentle stimulation of all the emunctories, an abundance of cold water to quench the thirst, as well as to flush the kidneys, and the judicious administration of stimulants and easily digested liquid foods when the the vital powers begin to fail. This will do in simple cases; but the difficulty lies in separating the complicated from the uncomplicated ones, as this disease, above all others, is very deceptive. Many cases which give every indication in the beginning of a happy termination end abruptly in death, and the converse; hence, we must resort to a method based upon more rational grounds if we would make any advance in the treatment of this affection, which seems to disorganize the blood *ab initio*. For a number of years it has been claimed by Sternberg, Joseph Jones, Bellver Mateo, Pedro Peñuelas, Alfredo García y García, and many other well-known students of this disease that it is a gastro-intestinal affection of microbic origin. Whether the bacillus or its toxins give rise to all the train of symptoms or not matters little, as the treatment, based upon this theory, must be one looking to ridding the intestinal tract of all offending substances, and of rendering it, by the use of antiseptics, unfit for the habitation of the bacillus. Acting upon this theory, Sternberg introduced to the profession his well-known bichlorid treatment; the Spanish surgeons stationed in Cuba—Mateo, Peñuelas and others—their naphtha and benzoate of soda treatment.

Dr. Alfredo Garcia of Santiago de Cuba, reasoning from the well-known fact that yellow fever does not occur in cold climates and that, when it does occur in the temperate zone, it tends to decrease with the fall of the temperature; yet, recognizing that its micro-organism can withstand 110° (centigrade) below zero, he conceived the brilliant idea of producing artificially in the tropics, by means of Cámara Polar, the frigid zone. This Cámara Polar is an ingeniously constructed building, somewhat on the order of our refrigerating storerooms, where the temperature can be rapidly cooled at will. Being a firm believer in the germ theory of the disease and of its well-known infectiousness, and having observed that its virulence was in proportion to the amount of infection present, and believing that each patient was subject to successive infections, during the five or six days of his illness, from the atmosphere around him, laden with the deadly germs contained in the gases thrown off by the skin, lungs, dejecta, and vomit in an atmosphere at a temperature suitable for their growth, he determined that as he could not transport his patients to a climate free from such surroundings, conditions, and temperature, he could at least transport the climate to his patients. He also claimed that the importance of these new infections has been demonstrated by the experiments of inoculation of Cheveaux Walson, Cheryne, and Bouchard, which go to prove that the number of microbes introduced into the organism influences the gravity and intensity of the disease. Garcia does not claim that the Cámara Polar exercises any specific action upon the microbe of yellow fever, but that the cold air of his chamber renders the micro-organisms and their products inert, as biology teaches that the microbe, like the cell, requires a suitable medium in which to live and fulfil its functions. By order of the Captain-General of Cuba a commission of learned medical men met in the military hospital of Havana on August 19, 1892, to discuss this new method. Dr. Garcia presented a list of 68 patients with yellow fever (after subtracting nine who suffered from intercurrent yellow fever) treated during September, 1890, at Santiago de Cuba, with a mortality of four, less than six per cent. Nine cases, all soldiers, were treated then, under the supervision of the commission in the military hospital in Havana, and two deaths occurred. The necropsies showed that one patient had ulceration of the pericardium, while the other suffered from mitral insufficiency together with adhesions of both pleuræ and congestion of the lungs which antedated the yellow fever and for which both soldiers had entered the hospital. The finding of the the commission was that neither of these fatalities was in any way due to the yellow fever or its treatment

by the Cámara Polar. Now it is well known that the Spanish soldier is, at best, but a poor subject for yellow fever.

Pardon me for taking up so much of your time in describing this treatment, but I did not think any article on the treatment of this dreaded visitor from the Indies, now knocking at our doors, would be complete without mentioning a method yielding such results. For as private practitioners the plan is *not feasible*, yet, if upon further investigation it proves valuable, there is no reason why a hospital, devoted to the treatment of the fever by this method, should not be erected. For the present, we will have to content ourselves with a plan of treatment suitable to private practice.

Hygiene.—The hygienic treatment consists in having the surroundings scrupulously clean; vaults, kitchen-drains, and gutters should be rendered as aseptic as possible by using solutions of sulphate of iron and bichlorid of mercury. Remove unnecessary draperies from the patient's bedroom and let the ventilation be free. Sunlight, that great foe to dampness, molds, and various bacteriologic forms of life, is to be insisted upon when practicable. The microbe of yellow fever, like the thief in the night, seems to delight in stalking in dank, dark places. We know that the bacillus of many diseases seems to owe to molds its power of proliferation, if not life itself. Patients treated in tents prove the benefit of ventilation, sunlight, and freedom from mold. All alvine dejecta, vomited matters, and urine must be promptly removed, and some deodorizing disinfectant used. All forms of excitement, such as much talking, reading aloud, and *whispering* ought to be interdicted in the sick chamber. The attendants must answer questions only, and not lead in conversation. Visitors must be rigorously excluded, and even nervous members of the family when their presence excites the patient. Nothing but cheerful facts should be imparted. The prevalence of the disease, business matters, the death of friends and loved ones should not be discussed. Should it become necessary to call in a consultant the patient's suspicions must not be aroused as to the gravity of his illness.

Dietetics.—There exists a wide diversion of opinion on this subject for the first four or five days. Most of the older and many of the modern practitioners recommend an absolute fast of four days at the least. No less an authority than Dr. Segundo Bellver Mateo, Surgeon-Major in the Spanish army and chief of the body of the military sanitation of Cuba, states in his "Tratiamento Médico del Vómito Negro," published in *Transactions of Pan-American Medical Congress*, 1893, that an absolute fast of at least five days must be insisted upon, asserting that the American cholera (typhus icteroides), like its Asiatic congener, must be destroyed by hunger and drowned in water (matalos de hambre y en agua a porgarlos). We cannot treat lightly the opinion of one whose table of mortality shows such brilliant results. He claims a death-rate of 1.5 per cent. in cases wherein treatment is commenced within twelve hours of the invasion of the attack; 3 per cent. in those of the second twelve hours of the first day; 13 per cent. in those of the second day; 30 per cent. in those of the third day, and 70 per cent. in those of the fourth and fifth day. Figures, if true, needing no comment, figures which show that the fate of the patient is dangerously compromised by delay—each twelve hours augmenting the danger. This point is further emphasized by the statistics of the Military Hospital of Havana, where the same relative results are obtained under a different plan of treatment. It will be seen from this the imperative necessity of promptness in beginning treatment, a necessity so great that to neglect it were criminal. Dr. H. D. Geddings, Past Assistant-Surgeon, United States Marine Hospital Service, advises milk and lime-water for the first few days, then light broth, with fat removed, and as the fever defervesces, soft-boiled eggs, milk-toast, bits of the white meat of chicken, and small portions of very tender broiled steak; the variety and the quantity of food to be cautiously increased for ten days at least before the patient's customary diet is allowed. Dr. C. Faget (*vide* Annual Report of U. S. M. H. S., 1894) recommends, from the beginning, milk in abundance, broth two or three times daily, and from two to six soft-boiled eggs a day. Dr. Alfredo Garcia does not advise any food before the third or fourth day, unless Jaccoud's tonic; brandy and gin can be classed in that category. These he administered sparingly during the first few days, as stimulants, not food. Dr. Viegas, a highly educated physician (four-years' study in the French capital), and a practitioner in Cuba for years and now a temporary resident of this city, assures me that he, together with many, if not all "practical" physicians in Cuba, prohibit all food the first few days, and after defervescence takes place its administration is cautiously begun and carefully limited as to quantity and digestibility. Our own distinguished colleague, Dr. Matas, pursues a similar plan.

I will not tire you by citing other authorities for this preliminary fast, varying from three to five days, *pro re nata*. In this connection we can all appreciate the aphorism of the great Sydenham, that "one-fourth of what *we eat keeps us* and *we keep* three-fourths *at the peril of our lives.*" Let us look into

the *rationale* of this fast. First, yellow fever is *not* a wasting disease, hence needs no preparative treatment; second, the short duration of the fever precludes the necessity for sustenance; third, the action of the liver, kidneys, stomach, and intestines, together with their digestive apparatus, are so badly handicapped by the deadly micro-organism of this disease, or its toxalbumins, as to render the absorption of any food improbable, if not impossible; fourth, as the liver, by reason of its degeneration, is no longer able to filter the bile from the blood, and the kidneys, for the same reason, the urea—it holds good; founded on practical experience, that to add further material in the shape of food to the already surcharged blood-current were to add fuel to the flame.

When the patient's condition warrants it the physician, at his discretion, may select from the following diet-list: Sweet milk, buttermilk, Horlick's malted milk, whey, white of a raw egg in half-glass of ice water, soft-boiled and shirred eggs, Valentine's beef juice, broths, well skimmed and strained, of chicken, beef, or mutton; oyster stew (not the oysters), corn-meal gruel, and oaten porridge. That preparation so much in vogue during 1878, miscalled beef-tea, cannot be too severely condemned, as it is neither beef nor tea. Most of the beef extracts in the market are valueless and should never be ordered. The best extract of beef, by all odds, can readily be made by expressing the juice from a rare round steak, free from fat, by means of a cheap meat extractor obtainable at any hardware store. The juice thus obtained, rich in albuminoids and organic salts, after being properly seasoned, is readily digested and extremely palatable. It should be taken as soon as made—hot. Should stimulation be required, champagne (dry preferred), brandy, rum, gin, Ducro's Elixir, Panopepton, elixir coca erythroxylon, hypodermics of strychnin and trinitrin will be found of great value.

Neither fruits nor vegetables should be allowed until convalescence is well assured.

Therapeusis.—Granting that Sanarelli is correct in believing the germ of this fever to have its habitat in the blood itself, and not in the gastro-intestinal tract, the fact still remains that yellow fever must be classed and treated as a septic disease, and the intestines, reeking with fetid and at times putrid contents, as evidenced by the odor of the dejecta, must be swept out promptly, and kept swept out, to prevent auto-intoxication. Granting Sanarelli's claim true, and let its logical sequence—serum therapy—follow, we would still have to remove the results of these germs, just as we open an hepatic abscess to remove the pus caused by a streptococcus or a staphylococcus, or the bacillus coli communis. All of our energies are bent on curing this septic fever by removing—not the *fons et origo*, the coccus—but the detritus, the pus, that slowly but surely is sapping the patient's vitality.

Intestinal antisepsis has been practically abandoned by even its most ardent admirers, for the average micrococcus seems better able to withstand germicides than his host. What an array of these germ-destroyers have been flaunted before the profession during the past ten years! and what claims have been made for them by our manufacturing pharmacists! Although we now recognize our utter inability to asepticize the intestinal tract, we can remove therefrom, by means of enemata, medicated or not, and purgation systematically employed, the great mass of septic matter.

Furthermore, we have reasons for believing that we may render the remaining contents of the intestines less actively poisonous by the use of such remedies as naphthols α and β, salol, benzoate of soda, bichlorid of mercury, peroxid of hydrogen, and so on to the end of the list. I have purposely left out the latest aspirant to public favor—formaldehyde—though its claims seem based upon good grounds. Believing this, the first indication in this disease would, logically, be the administration of a prompt and efficient purge, to be repeated if necessary; for, bear in mind that constipation, in this disease, is the rule. I deem it very important to state that I consider salines preferable to all others; and, furthermore, I place sulphate of soda at the head of the list, and this in doses of from 1 to 2 ounces in 6 ounces of water, *pro re nata*, to be repeated if vomited, for the following reasons: on account of its well-known action upon the liver; then it is the most active of the series, and last, though not least, it has stood the test of that hot-bed of yellow fever, Cuba, and is habitually employed by many of the eminent practitioners of that unhappy island.

Within two hours after the administration of the saline, I would put the patient, by preference, upon Sternberg's modified bichlorid treatment, which is:

℞	Natrii bicarbonatis	ʒ iv
	Hydrarg. bichlorid	gr. ss
	Aquæ dest.	O. ij.

M. Sig. One and a half ounces, every hour, ice cold.
—THE MEDICAL NEWS, vol. liv. June 15, 1889.

This treatment was used very successfully at Jacksonville, in the Garcini Hospital, Havana, and at Rio de Janeiro. In the first-named place, a mortality of 4.7 per cent. in 106 cases was obtained. The twelve patients so treated at Havana all recovered. Of the four in Rio one died.

Or I would order Beta Naphthol in 7½ grain

doses every hour or two, according to the indications, to be supplemented by a drink to be taken *ad libtum*, composed as follows:

℞	Natrii benzoate	3 ijss-iij
	Sacchari albi	3 ij- 3 iv
	Aquæ dest.	O. ij.

M. Sig. To be drunk freely, mixed with an equal quantity of seltzer water, ice cold.

This is practically Mateo's formula. Copious enemata of from one to three quarts of cold water, containing 2 ounces of sulphate of soda, should be administered each day, and high rectal irrigation by means of the tube is especially commended. The effect on the well-being of the patient and the temperature is often most marked. In spite of the well-known inhibitory effect of the anilin derivatives over the oxygen-carrying power of the blood and its ozonizing function, as well as their cardiac depressant effect, I would *yet* recommend, as do Drs. Geddings, C. Faget, and many others, their moderate use, the *first twelve* hours and no longer, under *any consideration*. Usually, one dose of acetanalid grains 5, or phenacetin grains 7 or 8, suffices to calm the excited patient and relieve his intense cephalalgia. The well-known analgesic properties of these drugs commend them. Never should more than three doses be administered to any patient. It is customary with some timorous practitioners to combine the citrate of caffein with these remedies to counteract their depressant action. This I believe to be based more upon theory than practice.

Of course, the use of pleasant effervescing purgatives, such as the solution of the citrate of magnesia, is not condemned, but, on the contrary, endorsed where the state of the stomach demands it. Castor oil, like hot drinks, is only mentioned to be condemned. With the olive-oil and lime-juice treatment I have no experience, but I would state that the Cubans esteem it very highly. Should nausea prove obstinate, all medication *per oram* and drinks should be discontinued, and a hypodermic of ¼-grain of cocain hydrochlorate be given, or else ⅙-grain of morphia combined with atropia gr. $\frac{1}{100}$. Cracked ice is often an efficient remedy. Creosote, also, is of great repute here. Sinapisms and dry-cups to the epigastrium are also valuable, as I can personally attest.

It has seemed to me that a mixture composed of Liquor ammoniæ acetatis and acetic ether, in sweetened water, has had a most happy effect in many cases treated by me; but I fully realize that such treatment is purely symptomatic. Salicylate of soda is inferior to the benzoate in several particulars and superior to it in none, hence it cannot be recommended. For the reduction of hyperpyrexia I regard nothing so good as cold water—baths, spongings, and enteroclysis. Patients should also be encouraged to drink cold water freely.

Dr. A. P. Merrill used, in 1820, during the epidemic at Bay St. Louis, nothing but cold shower-baths for reducing hyperpyrexia, the patient being well rubbed and covered up afterward. His treatment was calomel gr. xx, or oil, bleeding to faintness, and shower baths. Diet: Corn-meal gruel. Merrill claims to have treated 700 of Zachary Taylor's soldiers, with a mortality of seven. He claims equally favorable results elsewhere. Could it be possible that the results were due to his treatment or in spite of it? Personally, I believe judicious bloodletting in selected cases to be very valuable. I can never forget an accidental bleeding I gave a young girl, suffering from intense cerebral congestion and profoundly unconscious, the dreaded black vomit, harbinger of death, being hourly expected. I applied at midnight six large leeches, three on each side of the neck, swollen with its turgid vessels, directed the nurse to remove them when they had gorged themselves; went to bed and was aroused at 4 A.M. with the cheerful news that the girl was bleeding to death. The blood had saturated the mattress and run in a little stream on the floor to the fireplace, half-way across the room. I found my patient well-nigh exsanguinated, her face blanched, but her intellect clear, and she was practically convalescent. She made a good but slow recovery. Viewed from Sanarelli's standpoint, the loss of that amount of blood meant also the getting rid of just so many bacilli, and was scientifically, what it proved to be practically, good treatment. This subject will be briefly alluded to under the surgical caption.

The exhibition of the cinchona salts in yellow fever is believed to be productive of no good results, but of several untoward ones—notably, that of predisposing to hemorrhage, and of intensifying the nervousness. Unless malarial complications are *well* defined, these salts should never be given. I see no reason for Blair's celebrated initial treatment.

℞	Calomel	gr. xx
	Quinin	gr. xxiv.

At one dose.

Very many remedies have been suggested for checking black vomit, which, being but the result of the hyperemic condition of the stomach, should not be treated as a cause, but as an effect. Dr. Faget places great reliance upon the tincture of the chlorid of iron; Dr. Llenas of Santo Domingo, upon the perchlorid; others upon ergot. These and all other remedies are but broken reeds to lean upon at this crisis of the disease.

Quite a number of patients recover after this symp-

tom develops under any or no treatment, but not on account of it. The most fatal of all symptoms, anuria, taxes the physician sorely, and many are the expedients resorted to for stimulating renal secretion, but, in the vast majority of cases, all prove useless in the hour of need. Gone is my faith in nitre, watermelon-seed tea, local applications of squills and digitalis in equal parts (quijano), and the much-vaunted pilocarpin—that remedy which was supposed to make the skin take on the vicarious action of the kidney. That pilocarpin sometimes does good, and oftentimes harm, I do not deny. Wet cups have seemed to be beneficial at times; but in this connection it may not be amiss to state that *cured* cases of anuria often turn out to be cases of retention. Patients do recover after the occurrence of this grave symptom—but not many. That most violent and painful of all counter-irritants, the moxa, holds out some faint hope in this direction. Turpentine in dram doses, now readily administered in Planten's hard or soft capsules, is often given in this country; whereas gin, practically possessing the same therapeutic effect upon the kidneys, is given the preference in Cuba. This remedy is worthy of trial.

Surgical Treatment.—Intravenous injections of normal saline solution; toxidiffusion; blood-letting; hypodermoclysis; cupping. Great results are obtained from the use of the first of these procedures. Dr. Mateo considers that he has wrested from the very jaws of death a number of patients suffering from anuria by this means. There is no question about the very great value of this saline solution injected into the veins, in just the very conditions so often found in yellow fever—septicemia, uremia, and lack of arterial tension. This solution should be sterilized and perfect asepsis enjoined in its use. When the vital powers are flagging great good may be expected from it. Two or three pints of sterilized normal saline solution thrown into the circulation often acts magically. Toxidiffusion is strictly in line with modern thought, as, by its use, a portion of blood charged with septic matter and laden with microbes is removed from the patient, and an aseptic, life-giving fluid substituted. This added fluid serves to attenuate the remaining blood and renders it less septic. Blood-letting is only useful at the commencement of the disease. It is then often very valuable. Dr. J. P. Davidson thought it of unquestioned value. Leeches are embraced under this head.

Hypodermoclysis is but another form of "drowning" the patient—that is to say, of introducing water into the system. It is reported as especially efficacious in oliguria and anuria.

Cupping, once so much in vogue, has, to use Mr. Cleveland's hackneyed expression, sunk into "innocuous desuetude," a very undeserved fate, as both wet and dry cups are important adjuncts to our armamentarium.

THE SANITARY DISPOSITION OF GARBAGE.

BY FRANK DONALDSON, M.D.,
OF NEW YORK;
MEMBER OF COMMISSIONER WARING'S SPECIAL STAFF.

No measure in the sanitation of a city is more fruitful of beneficial results than that embodied in the proper care of the streets and in the sanitary disposition of garbage. In a great city the removal of ashes, paper, and similar waste products is a comparatively simple matter, but the final disposition of garbage is not the least important and troublesome task of the Department of Street-Cleaning. In seaport towns it is customary to tow the mixed wastes to sea and dump them far from shore. This was the method employed in New York until about one year ago, and theoretically, with the strong tides which prevail in the vicinity of the entrance to the harbor, it should have been entirely satisfactory. Such, however was not the case, the shores of Long Island being continually strewn with a mass of putrifying rubbish, a constant menace to public health. While this practice proved efficient as far as the city itself was concerned, it rendered seashore resorts comparatively uninhabitable during the summer months. Moreover, the absolute loss of whatever valuable products the garbage was capable of producing, when subjected to proper treatment, violated all laws of economy. These considerations led to the establishment of crematories or reduction-plants, not only for New York but for other cities, notably Philadelphia. Early attempts to get rid of garbage and at the same time to derive benefit from its destruction were defective, but the evolution of the process and final triumph was worked out by the authorities of New York City, and it furnishes an interesting and instructive lesson.

The first efforts in this direction resulted in the building of an ordinary furnace, a long brick affair with provision at the top for dumping in whole cartloads of rubbish, and an arrangement for maintaining a fire. Many noxious fumes were driven off by this process, and a second fire was maintained near the entrance to the chimney or smokestack, through which all the fumes passed and were largely decomposed and destroyed. Such furnaces simply destroyed the waste, and to that extent were satisfactory; but in order to extract products of commercial value from the garbage elaborate modifications were necessary. The process, as now conducted at Barren Island, will perhaps be best understood by

following the garbage in the various processes to which it is submitted. The garbage, separated from ashes, paper, tin-cans, and such waste material, is collected daily from each house in the city. The garbage-carts make their rounds on schedule time, and each householder sets out the garbage-can on the sidewalk, as nearly as possible, at the time the cart is expected. The scows promptly receive the contents of the carts at the dumping-stations. Thus, the average exposure of the garbage is eighteen to twenty-four hours, this time being necessary for loading a scow. Six hours are required to unload a scow, after which it is cleaned and disinfected before returning for another load. The average daily amount of garbage reduced during September was nearly six hundred tons, which is considerably less than the daily capacity of the reduction-plant. The receptacles are kept as clean as possible, their contents are dumped into carts and conveyed to scows moored at convenient dumping-places along the water-front, and these are towed by steam-tugs a distance of ten miles to the reduction-plant at Barren Island, on the southern shore of Long Island. Here the contents of the garbage-boats are carried by machinery up an inclined plane to the top of one of the buildings and dropped through chutes directly into perpendicular cooking-tanks, or digestors, about fifteen feet long and five feet in diameter. These number forty-eight, and are steam tight. The garbage is cooked by steam, which is forced through pipes opening into the bottom of the digestors. This process is continued five hours, at a temperature of about 300° F. This not only disintegrates, but completely sterilizes the contents of the tanks.

The cooking being completed, the mash is emptied into sheet-iron receiving-tanks, from which it is received into bags about thirty inches square. The filled bags then are placed in presses. The presses are sufficiently large to receive nine of these bags, one above the other, with appropriate slats between. Gradual pressure is applied, and the liquid as it is forced out runs into a tank, and the grease contained therein, as it rises to the top, is removed and placed in barrels for transportation. This grease is used largely for wheel lubrication, but some of it is refined and finds its way into other channels. The dark liquid remaining was formerly allowed to escape into the ocean, but it is now passed through a series of condensers, the final product being a substance rich in ammonia and phosphates. There remains a chemically pure and odorless water which is discharged into the bay. The solid material is then conveyed to the drying-house and placed in a masticating-machine, after which it is taken to the dryers, which are horizontal, steam-jacketed cylinders sixteen feet long, containing revolving shafts with arms. This drying operation continues from three to five hours, and when the mass, which is called tankage, has been sufficiently reduced, it is conveyed to the storage-floor, where it is put into bags for use as fertilizers. This fertilizer-filler formerly came from the dryers as very fine powder, and had a distinct odor; but recent improvements have been made, and the filler now comes out in the form of coarse grains. In this the odor is less, and there is no possibility of its being carried by the wind.

The relation of such a factory to the health of the community in which it is located is naturally determined by the cleanliness of the building and machinery, the condition of the garbage-water, and the manner in which it is disposed of, and the character and amount of odor which escapes. The sanitary condition of the building and machinery is such that little more odor is noticeable than that naturally arising from a large kitchen. This is accomplished by preventing the escape of the unpleasant gases which result from the cooking process. These gases are drawn through condensers, and after being chemically washed, are discharged into the bay diluted with from 50 to 100 times their volume of salt water. The grease is conveyed through closed pipes and promptly barreled, and the dark foul-smelling liquid from which it is drawn off is in its turn condensed, and finally escapes as a chemically pure, limpid water. Moreover, it has been demonstrated by this plant that as a mercantile enterprise the results are most satisfactory.

In making these assertions regarding the absence of objections to the presence in a neighborhood of a reduction-plant, like the one described, the writer is cognizant of the fact that many complaints have been made about the odors which at times annoy the inhabitants of the shores of Long Island, and which have been, and still are, attributed to the reduction-plant. Undoubtedly, as the plant was originally set, much of the odor complained of came from the cooking garbage, but the method as conducted to-day is practically free from these charges. When we consider what a menace to public health putrifying garbage in the streets and alleyways of a large city and along the neighboring shores is, the great importance of its prompt collection and sanitary disposition can hardly be exaggerated. At the present time, the question of garbage disposition seems to be satisfactorily answered by the success of the Barren-Island plant.

It is a significant fact that during the past summer the death-rate in the city of New York has been less than at any time in its history. No one would affirm that the clean streets and prompt disposition of the

garbage has been the only factor in producing this result, but undoubtedly it claims its fair share of credit. The Commissioner of Street Cleaning, in a recent article, declares that the improved methods of disposing of garbage has contributed largely to the reduced death-rate. The average death-rate from 1882 to 1894 was 26.78 per thousand; during 1895, 23.10; during 1896, 21.52; and during the first half of the year 1897, 19.63. He further calls attention to the important fact that if the latter figure is maintained throughout the year, there will have been 15,000 fewer deaths than there would have been had the average death-rate of the thirteen previous years been maintained.

THE NEW YORK QUARANTINE STATION AND ITS WORK.

BY A. H. DOTY, M.D.,
OF NEW YORK;
HEALTH-OFFICER OF THE PORT OF NEW YORK.

THE New York Quarantine Station is well equipped for the protection of this port against the entrance of infectious diseases. During the past two years active experimental work has been in progress at the laboratory connected with this department. The pathogenic organisms, the bacilli of the plague, cholera, anthrax, and diphtheria have been cultivated and studied. In conjunction with this the germicidal power of different disinfectants, particularly steam and formaldehyde, has been carefully investigated. The results obtained, which were very satisfactory, have already been published in the *American Journal of the Medical Sciences*, August, 1897, and the *New York Medical Journal*, October, 1897.

We are now dealing with facts, not with theories, and are able to perform disinfection in a prompt and scientific manner, with a certainty as to the result. Thorough disinfection is one of the great safeguards in preventing the extension of infectious diseases. Without it we are practically unable to deal with such an emergency. The failure to appreciate the importance of this has frequently been followed by disastrous consequences; therefore, every effort has been made at the New York Quarantine Station to prepare for the disinfection of vessels of all kinds. With the improvements which have been made during the past two years, including the construction of a disinfecting-steamer and laboratory, and the radical changes which been made in the disinfecting outfit at Hoffman Island, I feel justified in saying that this station is the best equipped of all in the world. The means for disinfection consist of the steamer "James W. Wadsworth," which is about 115 feet in length and is fitted with a steam-chamber of the most improved and modern pattern, placed in the stern of the vessel for disinfection with steam. A steel tank or chamber, having a space of 115 cubic feet and constructed for disinfection with formaldedyde gas, has been placed in the forward cabin. In addition, there is a furnace for the generation of sulphur dioxid, tanks for disinfecting solutions, etc. Bath and dressing-rooms are placed on each side of the boat, the ceilings, walls, and floors of which are supplied with enameled metal covering, in order that they may be properly cleaned and disinfected.

On the arrival of a vessel requiring disinfection, the "Wadsworth" steams alongside, and all persons, clothing, bedding, etc., which are to be disinfected are transferred to it. While this is in progress the ship, or that portion of it, presumably infected, is also submitted to a thorough disinfection. In this manner the work is promptly and thoroughly done, and commerce is interfered with as little as possible. This steamer can reach a vessel at any part of the bay or adjacent waters. The vessels usually disinfected by the "Wadsworth" are comparatively small, carry but few passengers, and come from Southern ports, in some of which infectious diseases usually exist. Occasionally, it is necessary to disinfect a steamer carrying a large number of steerage passengers. In such an instance, persons held for observation, with their baggage, and also the bedding belonging to the ship, are removed to Hoffman Island for treatment. The "Wadsworth" acts as a transport, and, after having removed the people to the island, returns to disinfect the ship.

About 2000 persons can be cared for on Hoffman Island. Bath-houses have been constructed which can accommodate one hundred bathers at one time. The large disinfecting-apartment on the island contains three double-jacketed rectangular steam-chambers, constructed of steel, each twenty feet long and about four by five feet in diameter. On the arrival of the persons above referred to, they are conducted to the bath-houses, where their clothing is removed, tied in bundles, tagged, and sent to the disinfecting-chamber. After the bath, woolen gowns are supplied. These are worn until the clothing is returned. These persons are detained until the expiration of the period of incubation.

The hospitals on Swinburne Island will accommodate about 200 patients, and although the buildings are old and not of modern construction, they are well supplied with beds, bedding, and apparatus for heating and lighting, and will answer the purpose until new pavilions are substituted. The State legislature has already appropriated money for the drawing of plans for the erection of new buildings both at Swinburne and Hoffman Island, and as these have been made and submitted to a committee it is ex-

pected that the necessary money for the buildings will be appropriated during the coming winter. Each of the islands is in charge of a superintendent, with a sufficient corps to keep the buildings and property in order and ready for immediate use. This duty is faithfully performed.

During 1896, 252,350 steerage passengers were examined at this station, and out of 12,127 vessels which arrived at the principal ports of the United States during the same year (1896), 6241, or more than one-half of the entire number, were inspected at the New York Quarantine Station. The work of 1897 will show about the same result. During this period, the plague, cholera, smallpox, yellow fever, and typhus have existed in numerous ports throughout the world, which have been in constant communication with New York, and although numerous cases of smallpox and yellow fever have reached this harbor no infection has passed the station. This fact will be appreciated when it is remembered that during certain portions of last year, also of this, from 200 to 300 cases of yellow fever, and an equal number of cases of smallpox, daily existed in the city of Havana. As this place is about three-and-one-half days' journey by water from New York, it is within the period of incubation of both diseases. In order that passengers arriving from Havana and other ports on the north side of Cuba, shall not be a menace to the health of this country, and at the same time that commerce should not be unnecessarily interfered with, it is required that all persons coming from Havana shall be supplied with a certificate to the effect that they have had yellow fever, or are natives of Cuba. In either case these persons are rarely subject to this disease and can be safely allowed to pass quarantine. Persons who do not present these certificates on their arrival are removed to Hoffman Island, there to remain until the difference in time between the period occupied by the passage and five days (the period of incubation of yellow fever) has elapsed. A number of persons thus held have developed yellow fever and have been transferred to the hospital at Swinburne Island. All vessels arriving from Cuban ports are subjected to disinfection. Their crews are not held for observation, as these persons are not allowed to leave the vessels, which are not docked but remain in the stream, where they are loaded and unloaded.

During the past summer yellow fever appeared at Panama and during a short period was quite active. A number of persons who reached Panama in transit to Colon, to embark on the Panama steamer bound for New York, became infected and the disease developed during the voyage; some died and were buried at sea and others were removed at this port. This condition required careful inspection of all persons on board, the removal of some for observation, and thorough disinfection of the ship. As some types of malarial fever are very similar to yellow fever and are frequently found among the passengers and crew of these vessels, it will be appreciated that a differential diagnosis is not easily made; consequently it is the rule to remove suspicious cases until the diagnosis has been fully decided. I am glad to say that in no instance has a case of this disease reached New York. These results have been secured only after the greatest care and watchfulness on the part of the officers of this department and the carrying out of most thorough disinfection.

In order that authentic information may be procured from ports which are frequently infected, and with which New York is in more or less constant communication, representatives or correspondents have been appointed at some of the Mediterranean ports, Egypt, and South America. For a comparatively small sum these correspondents, who, as a rule, are physicians, keep this department supplied with a knowledge of the sanitary condition of these places. This is usually done by letter, although in some instances the cable is brought into use. Such information is usually more valuable than that which is obtained by the ordinary bill of health issued by a consul or consular agent.

With the arrangements above described I feel confident that the Health-officer's Department of the State of New York is prepared for any emergency which may occur at quarantine.

WATER PURIFICATION HYGIENICALLY CONSIDERED.

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ASSOCIATE OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS, ETC.

(Continued from page 589.)

SKILFULLY constructed sand-beds, usually an acre more or less in area, are capable of purifying river and other surface waters very acceptably, provided there has been formed upon the surface of the fine, top sand layer a delicate and continuous film of confervoid vegetation, silt, and other fine particles which occur in such natural waters as require filtration. Since the first half of this century practical English working has demonstrated this very completely. This principle was introduced into Germany during 1856, but the true merit of the process and the essentials upon which its great hygienic value depends were not fully appreciated till more than a qurter of a century later. It was carried out in a very successful form at the Tegel river-lake supply of the Berlin waterworks in November, 1883, to remove the trouble-

some, pipe-obstructing growths of *crenothrix* which resulted from the admission of deep well-waters. There the process has been studied most carefully since that time, and the thorough chemic and biologic results, noted by Proskauer and others, have furnished an invaluable guide to the understanding of the conditions which underlie success with such filters. So, too, have the corresponding investigations by the English Local Government Board and by the Massachusetts Board of Health, whose results are given in detail in their reports published during the last seven years.

It is found that, unlike sewage filters, the sand-beds employed to purify water for public supply do their important work chiefly by virtue of the upper layer of fine sand, and particularly by reason of the presence of an unbroken, fine film allowed to settle upon the surface of the sand before the filtering begins. In proportion to the perfect quality of this very fine straining medium is the efficiency of the filter as regards the separating of all (or practically all) bacteria from the water that passes slowly through the filter-bed. This removal of bacteria is the criterion of hygienic merit. As the flow through is at the slow rate of not much more than four inches an hour, considerable chemic purification of the water takes place during its downward passage through the masses of sand and gravel. On the immense area of sand and gravel surfaces bacterial slime (zoöglea), containing great multitudes of nitrifying bacteria, is attached. As the water, containing one per cent. of oxygen or more (if quite cold), flows slowly over these, the putrescible organic matters present are, to a varying extent, still further converted into inorganic compounds. This chemic change is due to the vital activity of the permanently adherent nitrifying bacteria whose presence, especially at the top, makes an old filter more efficient in this respect than a new one; yet, as Gill and Piefke first showed, simple washing does not cause sand to lose this zoöglea slime. Before the paramount importance of the separation of bacteria was recognized, greater stress than now was laid upon determining the degree of this chemic action. At the most, the chemic improvement is, as Frankland expresses it, "slight," and is not of much hygienic importance as compared with the bacterial efficiency of the film on the surface.

Suppose, then, a plant carefully constructed. It has a settling-basin large enough to hold several days' supply of crude water. Each filtering-basin is an acre or more in area; the firm walls and especially the bottom are water-tight by means of several inches of good concrete. There should be no ventilating pipes rising through the bed, and no projection or irregularity on the walls to restrict the facility of maintaining a continuous, smooth surface of sand. That of the upper portion of the bed is very fine, although it is not found best to have the grains less than one-fourth millimeter ($\frac{1}{100}$ of an inch) in diameter. Two feet or much more of fine, washed sand (although some have even less than a foot and yet work very satisfactorily, as at Alexandria, Egypt[1]), are supported by coarse sand, and this by gravel and broken stone. This makes the filter about six feet deep. In some the sand rests on two courses of porous brick, and is reported to work well. The writer has not tested such thin filters. After filtering for from one to eight weeks, according to the condition of the crude water supplied, the sand surface will have collected so much slime and dirt that it is clogged, and water passes through only very slowly under any safe pressure. Then the inflow is stopped and water is drawn off through the outflow sufficiently to render the sand firm. Practised employees, having broad boards attached to the soles of their boots, go over the surface systematically, shoveling off the upper half inch or more of the fine soiled surface-sand together with the accumulated sediment above it. This is then removed to a neighboring washing arrangement. If this scraping has caused any disturbance of the even surface of the sand, this must be completely rectified, then all made smooth and perfectly level. At times more sand has to be added very carefully to replace that taken away by repeated scrapings. It is largely to obviate this that the sand-layer is made several feet thick at first, for the bacteria-separating efficiency may be equally good or nearly so if even less than a foot of fine sand be present, yet the brief increase in the number of bacteria, with the effluent which comes just after cleansing of the surface, is greater in shallow than in deep filters, probably because of mechanical disturbance of the bed in its deeper parts. The majority of experts think five-foot layers of sand yield better results than very thin beds.

After being cleaned and leveled, the filter-beds should have some of the purified water returned through the outflow pipe until the surface of the sand is just covered. Then crude water is gently introduced, through the regular supply-pipe, until the ordinary working height of three or four feet is reached. Care taken to accomplish this refilling without any disturbance of the sand surface is repaid by superior efficiency of the filter from the commencement of working, and by these means little or none of the first effluent may have to be wasted on account of containing too many bacteria. Before any water flows through, that carefully introduced should be al-

[1] *Ann. d. Hyg. Publ.*, 1895, p. 487.

lowed to stand for twenty-four hours. At the end of that time the all-important film will usually have formed upon the sand surface. If the sediment be insufficient, some coagulant, such as alum or iron salts, may be added to produce this; yet the natural film, especially if of minute earthy particles, works best. When once the film is sufficient to separate bacteria properly, as determined by the usual gelatin-culture test of samples allowed to flow through, but not yet turned into the hydrant supply, the filter may begin to work. The impure water above the filter-bed is constantly maintained at the same level, not exceeding fifty inches, and the outflow is automatically regulated so that not much more than four inches flow through the sand each hour. That gives a yield of not more than from two to three million gallons per acre in twenty-four hours. This is the highest safe yield generally considered practicable. Yet in the Twenty-seventh Report of the Massachusetts State Board of Health (1895), pages 517 and 518, it is stated that upon experimental filters of very small size ($\frac{1}{20000}$ of an acre) filtration at the rate of from five to nine million gallons daily has been shown capable of removing more than ninety-nine per cent. of all bacteria! The unfiltered water contained several thousand bacteria, being from the Merrimac River, which at Lawrence contained considerably less than 30,000 bacteria per cubic centimeter, the average being over 16,000. The sand was five feet deep and 0.38 millimeter ($\frac{15}{1000}$ of an inch) was its "effective size," this term indicating the "maximum diameter in millimeters of the finer ten per cent. of the sand grains." (See Twenty-fourth and Twenty-sixth Reports, pp. 541 and 703, respectively.)

Intermittency in operation, while necessary for sewage filtration, is both practically and theoretically less satisfactory than constant operation without cessation from one cleaning-time to another. This is especially so during winter. These filter-beds work continuously, then, when once the water is started running through them. The clearer the crude water, the longer the interval between cleanings. It is an advantage to employ settling-basins as large as practicable as a preliminary to the filtering process. They are indispensable when the supply is very turbid, such as are, notably, the waters of the Ohio and Missouri rivers. Gravity sand filter-beds, properly conducted and carefully managed, afford, on the whole, the most reliable artificial means of rendering an impure water fit for both domestic and general consumption. At their best they not only clarify the water, but also reduce the average number of bacteria to considerably less than one per cent. of the amount in the original crude water. At the same time, practically all disease bacteria are removed, yet some filters yield very poor results, whether because of incompetent management or through inherent defects in the construction, or by forcing a sand-bed to produce beyond its capacity. When the surface is frozen the results are more apt to be defective.

(To be continued.)

MEDICAL PROGRESS.

The Direction in Which Cancer of the Breast Spreads.—GEROTA (*Centralbl. f. Chir.*, Sept. 4, 1897) has made investigations to determine the course of secondary infection from cancer of the breast. He finds that the lymph-vessels are intimately associated with the branches of the internal mammary artery. This explains the occurrence of the infection of the retrosternal glands and the early adhesion of the pectoral muscles; and further, the occurrence of secondary nodules in these muscles. He also found that the glands of the thorax do not have independent sets of lymph-vessels but that these are in intimate relation with one another, which explains the spread of cancer from the right side to the left side, or the reverse.

Forty-six Cases of Placenta Previa.—PLATZER (*Centralbl. für Gynäkol.*, Aug. 14, 1897) presents a clinical report of forty-six cases of placenta previa. The results were as follows:

1. After expectant treatment, that is to say, by tampons or artificial rupture of the membranes (23 cases), the mortality of the mother was 0, that of the child, 39 per cent.; really, however, only 18 per cent., as two of the births were premature and in four cases the child was already mascerated.

2. After podalic version and spontaneous expulsion (8 cases) the mortality of the mother was 0, that of the child, excluding two mascerated fetuses, 83 per cent.

3. After version and immediate extraction (13 cases) the mortality of the mother was 23 per cent., that of the child 46 per cent.

From these statistics it appears that extraction is unfavorable for the mother and ought, therefore, to be rejected, even though it is somewhat more favorable for the child.

Paralysis of the Intestines after Abdominal Operations.—ENGSTROM (*Centralbl. für Gynäk.*, Sep. 11, 1897) says that paralysis of the intestines which follows laparotomy, sometimes producing death, does not always result from sepsis. He cites four cases in which death followed operation after fifty-seven hours, seven, eight, and ten days respectively. In these four cases there was not the least trace of peritonitis, which there would certainly have been if death had been due to sepsis after such an interval of time. Moreover, in one case the contents of the abdominal cavity were examined bacteriologically one hour after death and were found to be absolutely sterile. According to the author, a careful stimulation and nutrition of the patient, if necessary, per rectum, is a most important factor in preserving life.

The Advantages of Castration in the Defective.—FLOOD (*Jour. of the Amer. Med. Assoc.*, Oct. 23, 1897) presents conclusions upon the above subject drawn from observation of twenty-six cases. The boys were nearly all between seven and fifteen years of age. The first castrations were performed with the idea of preventing masturbation in certain cases in which the habit was most constant and the boy had no sense of shame, in addition to being a confirmed epileptic, and, of course, somewhat feeble-minded. The written consent of the parents or guardian was obtained. In every case masturbation ceased and the boy became fairer in complexion. A few also gained flesh. They became more manageable and more capable of reasoning and less inclined to quarrel. They ceased to give expression to lascivious thoughts and no longer enticed other boys to masturbate in their company. No melancholia has so far followed the operation. The mental effect was always good and in every instance the epileptic spasms became less frequent, though this improvement did not manifest itself until one or two years had elapsed. The effect upon girls was noted in only two cases, in both of which castration was performed before the patients were admitted to the institution. The results were favorable.

Influence of Castration upon the Mucous Membrane of the Uterus.—COHAN (*Centralbl. für Gynäkol.*, Aug. 14, 1897), by experiments upon rabbits, concludes that the immediate result of removal of both ovaries is atrophy of the uterus. The mucous membrane also decays, the changes being similar to those which occur at the climacteric though not identical with them. The causes of the changes in the genital organs which follow castration are unknown. The ligation of the tubes or of the spermatic arteries is of secondary importance in this connection.

The Constitutional Factor in the Causation of Hay Fever.—GRAYSON (*Ther. Gazette*, Oct. 15, 1897) mentions three factors which make up the etiologic combination of hay fever, *viz.*: an external irritant, some intranasal abnormality, and a constitutional element—"defective nutrition." The physician unaided cannot restore the nose to a state of health. In order to overcome the self-indulgence of the patient, regularity is recommended in eating, work, and play, while indiscretions of diet, lack of exercise, objectionable fancies in matters of clothing and bathing, and, finally, vicious excesses, alcoholic, narcotic, or sexual, will require the constant and most determined effort of the patient himself. The whole environment of the patient must be separately studied and provided for in the dietary scheme.

While it is true that if a man takes care of his muscles his nerves will take care of themselves, there is no closing of the eyes to the fact that to the average man exercise is distasteful; therefore, it is the more necessary to be explicit in instructions concerning it. Though there is nothing brilliant about this method of removing the constitutional factor of the disease, what it lacks in brilliancy is more than made up in certainty, and if the patient is possessed of grit and determination it brings a sure reward. It penetrates to and combats the very beginnings of the pathogenesis, and with this fact in mind, we can scarcely be over-confident in anticipating and prognosticating success.

THERAPEUTIC NOTES.

Pulque, in the Treatment of Scurvy.—IDE (*Phila. Polyclinic*, July 31, 1897) advocates the use of pulque, a Mexican drink, made from the juice of the *Agave Americana* (century-plant) in the treatment of scurvy and the scorbutic state. Pulque is an acid, unrectified wine, produced by fermentation, and contains in abundance the salts the lack of which is supposed to be the cause of scurvy. In an epidemic occurring in Puebla, Mexico, during 1892–3, 325 Mexican Indians were attacked, and were treated with large doses of pulque. The epidemic was quickly quelled, no new cases arising after the end of a week from the time the remedy was first administered to all the inhabitants.

Lactophenin in the Treatment of Typhoid.—F. GORDON MORRILL (*Archives of Pediatrics*, March, 1897) reports that lactophenin is used in the treatment of typhoid fever at the Boston Children's Hospital, and that 3- to 8-grain doses are very effective, and do no harm, producing a drop of 3.5° F. in the temperature within four hours, and inducing restful sleep.

The Ichthyol Group and Dermatitis.—KLOTZ (*Jour. of Cut. and Genito-Ur. Dis.*, October, 1897) writes of his experience during the last four years with strong solutions of ichthyol, thiol, and tumenol. Thiol has the same therapeutic advantages as ichthyol and costs about the same, but it lacks the well-known and rather disagreeable odor of the latter. One advantage which both possess that has not been mentioned by Unna, to whom their popular use is largely due, is the formation of a film upon the skin, if it is painted with the pure drugs, or a strong solution of the same, say fifty per cent. This film almost immediately forms, is not sticky, and affords an elastic covering which does not shrink, and is readily removed by water. Tumenol is not affected by water, and hence is of service in the neighborhood of the glans penis, etc. Over such a film an indifferent powder, such as the stearate of zinc, should be dusted. These preparations will rapidly relieve pain, burning, and itching in the various forms of dermatitis, including erysipelas, herpes zoster, acute eczema, and acute exacerbations of chronic eczema. Even on moist surfaces no pain worth mentioning follows their application. Unna reported a case of lichen urticarius, in which he painted the entire body of a six-year-old child with a fifty-per-cent. watery solution of ichthyol morning and evening. No doubt its use would be equally gratifying in variola, measles, and scarlatina. In chronic inflammatory conditions of the skin Klotz cauterizes the affected parts with liquor potassii diluted to suit the case. A swab of absorbent cotton soaked in this solution is thoroughly rubbed over the diseased area, which is then washed with water, and dried, and finally painted with ichthyol.

THE MEDICAL NEWS.

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SATURDAY, NOVEMBER 13, 1897.

THE YELLOW-FEVER EPIDEMIC.

AFTER an immunity from yellow fever extending over a period of ten years, the Gulf States have had a rude awakening from their fancied security by another invasion of the dread disease. Compared with previous epidemics the present one has not assumed alarmingly fatal characteristics, nor, thanks to the vigorous enforcement of sanitary and quarantine measures, has it included a very wide territory in its ravages. Still, the number of cases has not been inconsiderable (about 1800 to date) and the deaths have been sufficiently numerous (about 300) to sadden the entire community in which the epidemic prevails. Moreover, alarm among the people has been widespread, regular lines of traffic have been interrupted, and the suspension of business has caused a loss of millions of dollars.

The latest reports from the infected districts indicate fewer cases and more recoveries. Fortunately that natural sanitary agent, Jack Frost, has appeared upon the scene, the quarantine at various points is being raised, and the country is rejoicing in the conviction that the epidemic nears its end.

This incursion of yellow fever has awakened renewed interest on the part of bacteriologists, therapeutists, quarantine officials, and sanitarians throughout the country, not only in the etiology and treatment of this disease, but also in more efficacious quarantine measures. This issue of THE MEDICAL NEWS is largely devoted to these subjects, and cannot fail to be of unusual interest and profit at this time.

THE MARINE HOSPITAL SERVICE AS A NATIONAL GUARDIAN OF PUBLIC HEALTH.

THE time, perhaps, has not yet arrived for the management of endemic disease by other than local authority. In dealing with contagious and infectious diseases brought from other countries a national jurisdiction is imperative. Quarantine regulations affect foreign commerce; the detention, inspection, and disinfection of vessels and the management of crews, passengers, and merchandise concern the people and commercial interests of the whole country, and should be uniform and consequently national. For all practical purposes, therefore, the most important function of a guardian of public health is to administer a strict and impartial quarantine against alien diseases, such as plague, cholera, and yellow fever.

The recent terrorizing invasion of our country by the last-named exotic has aroused the people to the point of demanding more efficient protection from foreign and preventable disease. That a guardian of public health is needed no one will deny, but it is needed *at once*, and it must be capable and potent. The speedy creation and organization of a Department of Public Health fulfilling such conditions is impossible. Any effort in that direction would be an experiment, the ultimate results of which could be determined only after years of trial. Such experiments are uncertain except in the single item of expense. It is the duty, therefore, of every thinking, patriotic citizen to urge his Representative at Washington to hasten by legal enactment the endowment of the Marine Hospital Service with full Public-Health duties and powers.

Some captious critics have inveighed against the youth and inexperience of Marine Hospital surgeons. Let such know that the average age of the 16 surgeons is fifty years, of the 26 passed assistant surgeons, thirty-five years, and of the 19 assistant surgeons, twenty-nine years, and let them also remem-

ber that "a prudent youth is superior to a stupid old man."

Marine Hospital surgeons are well educated. Many of them have held and some still hold professorships in medical colleges, in spite of the fact that they are subject to change of station every four years or oftener. For admission to the grade of assistant surgeon they pass an examination, and must have an average of eighty per cent. in all branches. Successful candidates are relatively few. Of the 61 medical officers of the corps, 53 have had a previous hospital experience, 7 have been in private practice, and only 2 have had neither private practice nor hospital service.

There are no men more experienced in the theoretic and practical workings of quarantine than the members of the medical corps of the Marine Hospital Service. They make investigations into the cause, nature, life history, and prevention of epidemic diseases, and work in a laboratory fully equipped with the best modern appliances.

The discipline of the force is excellent. The surgeons assume posts of danger with alacrity, submit to great personal privation and exposure, and unflinchingly face a death which has come to several of their number in preventing and combating epidemic disease. Direct testimony as to the efficiency and capability of the Service has been demonstrated in the present epidemic of yellow fever. In many localties the authorities have asked to have a Marine Hospital surgeon detailed to their district to verify or disprove diagnoses, to direct quarantine matters, to organize detention-camps, and to render other assistance for which their experience and training especially fit them.

The Marine Hospital Service at present is supported by the authority of the Treasury Department and is advised by the Department of Justice. Belonging as it does to the Treasury Department, the Marine Hospital Service can decide and enforce any quarantine regulation properly and promptly.

With judicious additions to its ranks, with added authority and duties, and complete control of coast, border, and interstate quarantine, the Marine Hospital Service would give us what we have never had, a practical, scientific, and effectual quarantine, free from vexations, fees, devoid of unequal, oppressive exactions, and administered with military precision.

In the Marine Hospital Service, therefore, we have an organization ready for *immediate*, *capable*, and *potent* administration not only of quarantine affairs, but also of *all matters of Public Health.*

REDUCTION OF GARBAGE: ITS SANITARY IMPORT.

FOR a period of one week during the past summer the average death-rate per thousand in New York City was less than in any one week since the establishment of the Bureau of Vital Statistics. The weather from early spring until late in the autumn was characterized by sudden exacerbations of extreme temperatures, the thermometer registering over 90° F. several days in succession, to be followed by a period of equal duration in which the humidity was extreme; this in turn succeeded by a period of low temperature. The unusual death-rate, therefore, cannot be justly attributed to the salubrity of the climate; on the contrary, the weather was such as to favor prompt decomposition of animal and vegetable matter and the development of malignant germs. No little credit for the steady improvement in the health of the city must be attributed to the thorough work of the summer corps of inspectors which has been organized by the Board of Health. By means of the information furnished through this source, many cases of simple disease secured prompt medical attendance and all contagious and infectious diseases were immediately suppressed in consequence of the timely action of the health authorities. The marked improvement in the health of the people during the past summer points to some other active agent as the prominent factor in producing these salutary results. It is accepted by all authorities that this agent is none other than the clean streets and efficient method of disposing of the city's garbage and household waste which was inaugurated three years ago, and brought to its present high state of perfection during the recent summer months.

The prominent features of this system are: (1) careful separation of the garbage from ashes and other waste; (2) its prompt collection and transportation to the city's reduction-plant, a distance of about twenty miles, where it is submitted to a process which is fully described in this issue of THE MEDICAL NEWS.

The facility and care with which the streets have been cleaned and the waste collected and disposed of are facts to be noted. The efficient manner in which this is done has contributed largely to the sanitary condition of the city—the heedless methods which formerly characterized the disposition of garbage, the uncertain hour of its collection, the careless handling by which much of it became scattered about the streets, have been effectually corrected. The revolting appearance and noisome odors due to the endless rows of garbage-barrels, which in past years characterized the streets of New York, have disappeared, it is to be hoped, forever.

Not the least important feature of the present system is the economic element which enters into it. By carefully separating such articles as have a commercial value, such as rags, paper, bones, tin-cans, etc., and by extracting marketable products from the garbage at the reduction-plant, it is estimated that even in the city of New York where municipal business is credited with being conducted in the most extravagant manner, one-half of the expense of disposing of the waste products of the city is saved.

The enormous cost of keeping cities of even moderate size in a sanitary condition prevents the adoption of methods to that end; but if it can be satisfactorily demonstrated that fully one-half, and probably in smaller communities a still larger proportion, of the expenses can be extracted from the waste products, thorough methods of sanitation can be brought within the reach of every well-conducted municipality. The experience of New York should prove a most instructive object-lesson to the intelligent communities of this country, situated in more southerly latitudes where infectious and contagious diseases are more rife.

New York maintains a low mortality because its inhabitants are protected in two ways, *i.e.*, by careful and stringent quarantine, and by such sanitary measures as have been detailed. Mark Twain in a recent article describes Mauritius as "an island which depends for its health upon quarantine and not upon sanitation." The decimating epidemics which periodically sweep over the island render it a by-word and a reproach; but where efficient quarantine and wise sanitation are combined, an intelligent community may laugh disease to scorn in any land and under any sky.

ECHOES AND NEWS.

Medical Students in Germany.—The various German universities enrolled 8232 medical students during the first six months of 1897.

New York Foundling Hospital.—Dr. Henry C. Coe has been appointed Consulting Gynecologist to the Hospital to succeed the late Dr. Lusk.

Bequests to Chicago Charities.—By the will of the late George M. Pullman, $130,000 will be divided among thirteen charitable institutions of Chicago.

Tubercle Bacilli in a Cigar.—Dr. J. C. Spencer, bacteriologist of the Board of Health of San Francisco, Cal., reports that he discovered tubercle bacilli in a cigar made in China.

Intravenous Injections of Sea Water.—M. Quinton recently advocated, at a meeting of the Paris Biological Society, the use of sea-water instead of artificial serum for intravenous injections.

Dr. Joseph Collins Elected to Professorship.—Dr. Joseph Collins has been elected to the Professorship of Nervous Diseases in the New York Post-Graduate Medical School made vacant by the resignation of Dr. Charles L. Dana.

Abuse of Hospital Charity.—In a recent issue, *The Lancet* comments upon the fact that a pugilist who had defeated his antagonist and won a purse of $3000 went to a charitable institution to be treated for a broken arm received in the fight.

Death of a Centenarian Doctor.—The death is announced of Dr. William B. Sprague at Cold Water, Michigan. He was born more than a hundred years ago at Malta, Saratoga County, N. Y., and practised medicine until he was ninety years old.

King of Sweden's Donation to Tuberculosis Sanatoria.—On the twenty-fifth anniversary of his accession to the throne, the King of Sweden donated a sum of 2,200,000 kroners to be applied toward limiting tuberculosis by the erection of sanatoria and other means.

Smallpox at Montreal.—Smallpox has again appeared at Montreal, in the person of a young girl who had been attending a school kept by the nuns of the Congregation of St. Catherine, and which has about 500 resident pupils. As a result the school has been quarantined.

Delegate to International Congress of Hygiene.—Major Alfred C. Girard, surgeon, U. S. A., is detailed as a delegate to represent the Government of the United States at the Ninth International Congress of Hygiene and Demography, to be held at Madrid, Spain, April 10 to 17, 1898.

Another Typhoid Epidemic in an English Town.—Typhoid is prevalent at King's Lynn, England, more than two hundred cases having been reported. The cause of the outbreak is attributed by the sanitary authorities to pollu-

tion of the water-supply by surface water after a thunder-storm.

Consolidation Officially Postponed.—The Regents of the University of the State of New York, in accordance with the request of Bellevue Hospital Medical College and the New York University, have reconsidered the ordinance of April 8th providing for the consolidation of the two medical colleges; the matter of the proposed consolidation was laid on the table.

Mismanagement of Sanitary Service in the French Army.—Typhoid fever has recently appeared in many of the garrison towns in France, and its origin has been traced to a faulty water-supply. This has led to complaints of mismanagement of the sanitary department of the army. It is also said that the Commissariat Department has permitted the purchase of meat unfit for food.

Michel Angelo's Collection of Prescriptions.—There has been found in the Vatican Library a collection of prescriptions and directions for treating various eye diseases in the handwriting of Michel Angelo. These were probably obtained from medical friends for his own use, for the great sculptor suffered from an eye trouble which nearly made him blind before he died.

No Football in Georgia.—On account of the fatal injuries received during a game by a member of the University of Georgia football team, a bill was recently passed in the House of Representatives prohibiting football in all universities and other institutions in Georgia which receive aid from the State. A similar bill was also introduced in the Senate.

Notification Fees.—In Huddersfield, Eng., the notification of cases of infectious disease is enforced under a law which provides that a medical practitioner shall be paid the fee of 1 shilling for each certificate. He need not notify, however, and will not be paid any fee in regard to other cases of the same disease occurring in the same house during the thirty days following the date of the first certificate.

Typhoid Fever and Certain Games.—An English practitioner, in writing to *The Lancet*, refers to the fact that many cases of typhoid fever occur in the autumn, and attributes the cause of the disease to games, such as marbles and peg-top, which are played in the street during this time of the year after the cricket season is over, In playing marbles a boy frequently licks his fingers to prevent the marble slipping, and the whip-cord of a top is wet in the mouth for the same reason. In this way germs are conveyed into the alimentary tract. The writer's theory is borne out by the fact that the disease almost exclusively affects boys.

Obituary.—The death from pneumonia of Dr. Joseph E. Culver, of Jersey City, N. J., is announced. He was born in Groton, Conn., in 1823. He studied medicine at Pittsfield, Mass., and also at the College of Physicians and Surgeons, New York, where he graduated in 1849. He was a charter member of the New Jersey Medical Academy, a member of the New York Pathological and Neurological Societies, and one of the staff of St. Francis' Hospital, Jersey City.—Dr. Charles H. Avery, Secretary of the New York County Medical Society, died of diabetes on the 2d inst., at his home in New York City, in the sixty-third year of his age. He was born in Perryville, Madison County, N. Y. He was a graduate of the Long Island College Hospital, and for more than thirty years practised medicine in New York.

Health Reports.—The following statistics, concerning smallpox, yellow fever, cholera, and plague, have been received in the office of the Supervising Surgeon-General of the United States Marine Hospital Service, during the week ended November 6, 1897:

YELLOW FEVER—UNITED STATES.

		Cases.	Deaths.
Mobile, Ala.	October 30–November 5.	74	5
Montgomery, "	October 30–November 3.	25	3
Selma, "	October 30–November 4.	1	1
Wagar "	To November 3.	45	3
Whistler, "	To November 1.	25	2
Baton Rouge, La.	October 22–31.	3	1
New Orleans, "	October 30–November 5.	266	54
Bay St. Louis, Miss.	October 29–November 5.	42	2
Cayuga, "	November 5.	1	..
Clinton, "	October 31.	2	..
County Farm, "	November 5.	1	..
Durant, "	November 1.	1	1
Edwards, "	October 30–November 4.	4	..
McHenry, "	November 2.	1	..
Nitta Yuma, "	October 30–November 4.	9	..
Pascagoula, "	October 30–November 3.	6	..
Scranton, "	October 30–November 4.	35	3
West Pascagoula "	November 2 and 3.	8	..
Memphis, Tenn.	October 30–November 5.	19	10

YELLOW FEVER—FOREIGN.

Rio de Janeiro, Brazil.	September 25–October 2.	1	..
Cardenas, Cuba.	October 16–23.	0	2
Cienfuegos, "	October 17–24.	0	1
Ha "	October 21–28.	0	14
Ma illo, "	October 15–22.	0	3
Sagua la Grande, "	October 9–23.	102	3
Santiago de Cuba, "	October 9–23.	0	15
Kingston, Jamaica.	October 9–16.	1	..
Manchester, "	October 9–16.	1	1
Portland, "	October 9–16.	1	..
Port Royal, "	October 9–16.	3	2
St. Andrew, "	October 9–16.	1	..

SMALLPOX—UNITED STATES.

New Orleans, La.	October 16–23.	1	..
Bay City, Mich.	October 23.	3	..

SMALLPOX—FOREIGN.

Rio de Janeiro, Brazil.	September 25–October 2.	19	..
Santos, "	September 18–25.	1	..
Sagua la Grande, Cuba.	October 9–23.	67	4
Gibraltar.	October 10–17.	1	..
Moscow, Russia.	October 2–9.	1	1
Odessa, "	October 9–16.	1	1
St. Petersburg, "	October 9–16.	6	..
Warsaw, "	October 9–16.	..	9
Madrid, Spain.	October 12–19.	0	2

CHOLERA—FOREIGN.

Bombay, India.	September 28–October 5.	..	32
Madras, "	September 25–October 1.	..	3

PLAGUE—FOREIGN.

Bombay, India.	September 28–October 5.	..	44

Yellow-Fever Notes.—On the night of November 2d there was a slight frost at New Orleans and throughout the State of Louisiana. On the 4th inst. the Board of Health of Louisiana issued an order raising quarantine against all points. Passengers from Montgomery, Mobile, and coast points, coming to New Orleans are obliged to have certificates from health-officers to the effect that for ten days previous to their departure there had been no yellow fever in the houses in which they were residing. All baggage and household effects from the points mentioned will be disinfected at the Rigolets Station under the supervision of the quarantine officers.

No new cases were reported in Montgomery, and quarantine against all points has been raised and travel and trade are no longer restricted.

On the 5th inst. twenty-five new cases and ten deaths were reported in New Orleans. No new cases occurred at Montgomery, Ala., and none at Selma, Ala.; one new case and one death were reported in Highland Park, Ala. Eleven new cases and two deaths occurred at Mobile, Ala. Two new cases were reported at Cayuga, Miss.

On the 6th inst. the record in New Orleans was twenty-one new cases and five deaths; many recoveries were reported. Five new cases and one death were reported in Mobile, Ala., and quarantine has been raised at that place. One new case occurred at Memphis, Tenn., and three new cases at Montgomery, Ala.

Twelve new cases and eight deaths were reported in New Orleans on 7th inst. The general feeling is that the epidemic is practically over. Up to date the cases are as follows: Total number, 1743; deaths, 236; recovered, 940; still under treatment, 566. One death occurred at Montgomery, but no new cases. Four new cases were reported at Mobile, Ala., and one death at Memphis, Tenn. The opinion is expressed by health-officers that the open-air development of the disease is at an end and that it will soon die out.

CORRESPONDENCE.

THE FOURTH DIVISION EXPLAINS.

To the Editor of THE MEDICAL NEWS.

DEAR SIR: The Fourth Division of Bellevue Hospital declines to enter upon a personal controversy as to its action in making such nominations as it has deemed most conducive to the interests of the institution. In the exercise of its properly delegated authority and in its discretion, it recently nominated to the Commissioners of Charities a gentleman to fill an existing vacancy upon the division. This nomination was rejected, and the nominating privilege abrogated in order that a purely political appointment might be made. The division had been unpledged to any candidate, either as a unit or by the action of its individual members. The names of three candidates were presented for its consideration; two were those of gentlemen exceptionally well qualified in every way and representative members of the medical profession, and it was no disparagement to either that only one could be chosen. The third name was that of a very persistent gentleman, then holding a subordinate position, whose appointment, it was thought, would be in every way less to the interests of the hospital. The correctness of that opinion may be estimated from the nature of the public communication which we are compelled to notice.

As this response to an editorial suggestion will end, so far as we are concerned, the discussion of an unpleasant matter, and lest silence should be construed as a recognition of the truth of various gross misstatements, it may be said briefly: (1) That the former assistant physician who makes complaint was appointed in 1896 at the request of a political friend, and was reappointed in 1897 at his own urgent solicitation. (2) That no member of the division has ever stated that the name of any applicant for appointment would be refused consideration. (3) That the Commissioners of Charities in returning the nomination did not assign the reasons for rejection and did not ask that additional names should be submitted.

(It may be added that the complainant himself was insistent that more than one nomination should be made, and his own name included, as he at the same time declared that in such case he would be appointed whoever else might be nominated. To have acceded to his demand would have been tantamount to the withdrawal of the nomination already made. His reiterated assertion that he would be appointed whether nominated or not, proved to be true.)

(4) That the Fourth Division submitted no plan for the reorganization of the hospital.

(5) That the intimation that the Fourth Division has refused consideration to any applicant for appointment on the ground of his financial disability, lack of social position, or the fact that his practice was among the poor, is utterly unfounded and unwarranted.

Finally, we are unable to perceive that the appointment of the gentleman nominated would have been in any way an affront to the general profession which we represent in the service of Bellevue Hospital, or to believe that it would have been less acceptable than the one which has been made without our approval.

Adopted at a special meeting of the Division.

W. F. FLUHRER, M.D.,
Secretary.

NEW YORK, November 10, 1897.

TRANSACTIONS OF FOREIGN SOCIETIES.

Paris.

ORIGIN OF HEPATIC CIRRHOSIS—DANGERS OF OPERATIONS UPON THE THYROID IN EXOPHTHALMIC GOITER—IMMEDIATE LAPAROTOMY IN GUNSHOT WOUND OF THE ABDOMEN—INTESTINAL PARASITES AMONG CHINESE AND EUROPEANS IN PEKIN.

AT the session of the Academy of Medicine, held September 7th, LANCEREAUX spoke of *hepatic cirrhosis in alcoholic subjects.* An experience of many years has convinced him that cirrhosis is caused by wine drinking rather than the drinking of strong liquors. Granting the truth of this statement it is necessary to seek for some substance other than alcohol as a cause of the cirrhosis. Lancereaux believes that he has found such a

substance in the bisulphate of potassium, which exists in considerable quantities in some wines. Guinea-pigs, rabbits, and dogs, which receive daily from 2 to 7 grams (30 to 100 grains) of bisulphate of potassium die in from six to eighteen months with all the symptoms of hepatic cirrhosis. When one considers the exact location of alcoholic cirrhosis it is seen to be situated chiefly in the perilobular branches of the portal veins; and it is rational to believe that the potassium salts introduced into the blood exercise a direct action upon these vessels and the adjacent connective tissue. The sale of wines containing large quantities of bisulphate of potassium (4 to 6 grams per liter in some instances) ought to be prohibited by law.

At the session of September 14th, PONCET spoke of the *dangers of thyroidectomy in exophthalmic goiter.* It is not so much the operation that is dangerous as is the removal of the thyroid gland. Those surgeons who have operated extensively have had cause to regret a number of deaths probably produced by one of two causes: (1) An acute intoxication by the products of an altered gland suddenly discharged in large quantities into the circulation; or (2) grave disturbances in the cardiac and arterial mechanism due to irritation of the sympathetic nervous system. At any rate thyroidectomy in this variety of goiter has an immediate mortality of from fifteen to thirty per cent. The patients die after well-marked symptoms, consisting of a sharp rise of temperature, a pulse of from 180 to 200 per minute, agitation, anxiety, profuse sweating, and finally collapse in from one to three days subsequent to the operation. Because of its dangers the operative treatment of exophthalmic goiter ought to be abandoned, or be confined to resection of the sympathetic in cases in which the tumor is not very large. If it is so large as to threaten suffocation an attempt may be made to relieve the pressure upon the trachea by long incisions over the hypertrophied thyroid gland.

At the session of September 21st, CHAUVEL mentioned an instance in which *immediate laparotomy was performed for gunshot wound of the abdomen.* He advocated in all cases of abdominal wound, whether made with ball or blank cartridges, an immediate laparotomy, and search for, and repair if possible, of injuries of the intestines without waiting for the development of symptoms (a practice which has been followed in America for a good many years).

The *value of a pure water-supply* is clearly shown by a report made by MATIGNON on the relative frequency of intestinal parasites among the Chinese and Europeans in Pekin. Among Europeans who, as a rule, use boiled water, ascaridies occur in only about one-fourth of the population, a percentage which is far below the occurrence of the same parasite among the Chinese who use water of a poor quality. On the contrary tenia is more common among the Europeans than among the Chinese, due apparently to the fact that the former eat much more beef than the latter.

MOTY read a paper in which he attempted to prove that most *accidents connected with wisdom teeth* are due to the proliferation and inflammation of the epithelial processes included between the roots of these teeth. The pus of the abcesses thus caused is originally aseptic, but the difficulty it has in reaching the surface causes the inflammation to spread into the dental canals and into the neighboring bony tissue. To this extension is due the gravity of the affection.

Moscow.

At the Twelfth International Congress recently held at Moscow, CZERNY read a paper upon *Therapy of Carcinomatous Stricture of the Esophagus, Pylorus, and Rectum.* In the first of these three situations, one has little to hope from a radical operation. The cancer is only exceptionally situated so high up that an esophagotomy is possible below it. Dilatation by means of esophageal bougies is only allowable in dense growths, as it has a tendency to hasten the destructive processes in soft or ulcerating cancers. The operation to be considered is, therefore, a gastrostomy. Of those methods which have been advocated, one of the latest by Marwedel, is the most satisfactory. Its essential principle is to open the stomach wall as well as the abdominal wall by means of an oblique incision. Using a catgut suture the stomach is fastened to the abdominal parietes, and then opened, and a tube obliquely stitched into its wall. These sutures loosen in five to eight days sufficiently to permit removal of the tube, and feeding is then continued by means of a catheter, while the fistula is readily kept closed between meals by the use of a gauze pad. If the canal shows any tendency to contract it may be dilated with tubes, gradually increasing in size, until the required dilatation is affected. Czerny has performed the operation fourteen times, losing only three patients, one from inanition within the first day, one from pneumonia within five days, and one from ulceration of the carcinoma into the trachea, eighteen days after operation. All the others rapidly gained in weight.

With the development of gastro-enterostomy, resection of the pylorus for cancer has become more infrequent. From 1881 to 1893 Czerny performed the former 20 times and the latter 18 times; since 1893 he has resected the pylorus 10 times, and performed 70 gastro-enterostomies. As the results after the simpler operation are so good, as far as improvement in general condition is concerned, it is unwarrantable to subject the patient to the greater risk of removal of the pylorus unless, as is too rarely the case, it is freely movable. If a radical operation is still a possibility, it of course makes a more favorable prognosis possible; but if the surgeon waits to have the diagnosis established by a well-marked tumor, cachexia, absence of hydrochloric acid, or metastasis, then it is almost surely too late. The best operation is that of V. Hacker, the anastamosis being made between the posterior wall of the stomach and the jejunum. With the aid of Murphy's button and good assistants, this operation may be performed in uncomplicated cases within fifteen minutes. If the stomach is so infiltrated that the posterior wall is inaccessible, the anastamosis may be made with the anterior wall (Wölfler's method). Naturally these are the worst cases, and it is not surprising to find that the mortality from this method

is forty-six per cent., as against a mortality of seventeen per cent. from the method of V. Hacker. In three cases the clinical diagnosis of carcinoma was apparently complete. Nevertheless, they all gained rapidly after the gastro-enterostomy, and ultimately recovered. Czerny is, therefore, in doubt whether the diagnosis was faulty, or whether these were instances of spontaneous disappearance of a malignant growth. Unfortunately no section for microscopic examination was made in any one of these cases. Resection of the pylorus was performed 22 times for cancer, 9 of these patients dying within the first month, 2 of them are still living after thirty-seven and seventy-eight months respectively, with no sign of recurrence.

The permanent results in cancer of the rectum are far more satisfactory than those obtained in cancer of the upper portions of the alimentary canal. Thus, of 109 radical operations, 10 died from the operation; 12 lived or are living less than two years without recurrence; 21, over two years; 15, over three years; 13, over four years; and 8, over five years. When such results as these are possible after a radical operation, palliative measures are not to be considered in suitable cases. It is the duty of surgeons to so improve the technic of the operation as to still further reduce the mortality and the probability of recurrence after operation; and it is the duty of physicians by careful local examination to establish an early diagnosis, and to persuade the patients to submit to early and radical treatment.

In 21 instances the rectum was curetted. As this procedure was twice the cause of perforative peritonitis, and at best had only a temporary good effect, Czerny has abandoned it for colostomy, which he has performed 45 times, with a mortality of seven per cent. Linear rectotomy, which is fitted only for scirrhous cases, and like curetting gives relief merely for a few weeks, has also been abandoned for colostomy. The mortality of the resections of the rectum by the sacral (Kraske) method is 13.64 per cent.; while that of the perineal method is only 3.6 per cent. But this is again an unfair comparison, as the simpler cases alone were attacked by the perineal route. Enough time has not yet elapsed to say which method gives the best ultimate results, though it seems probable that the sacral operation, by affording a clearer field, enables the operator to more surely remove all affected tissue.

The retention of feces after operation depends upon the seat of the new growth. It is a safe rule to cut through healthy tissue at least one inch from the tumor. If this is done, and the whole or part of the sphincter remains incontinence is usually avoided. Even if the sphincter is wholly removed, the use of a rectal irrigation once or twice daily, will in many cases prevent incontinence. Gersuny's plan of twisting the bowel to prevent incontinence has not been found practical.

Czerny said he prefers the parasacral incision. He divides the sacrum below the third foramen, as paralysis is likely to follow a higher section, reflects the bone flap, separates the bowel, ligates and divides it above and below the neoplasm, removes the tumor, secures all bleeding points, and sutures the cut ends of the bowel at least partially before the elastic ligature is removed from the upper end. The pararectal wound is washed out with a 1–3000 bichlorid solution, and then with salt solution. A large rubber tube covered with iodoform gauze is introduced into the bowel to provide for the escape of feces. Czerny prefers the osteoplastic method as giving a support to the bowel. He sutures the wound very lightly or leaves it open altogether.

Of the palliative operations, only colotomy was spoken of. The relief which follows in cases in which the bowels are evacuated with difficulty inclines one much to this operation in hopeless cases, even though it gives but temporary emelioration of the symptoms. If the carcinoma causes diarrhea and pain the relief after colostomy is less striking, although authors have mentioned instances in which the withdrawal of the irritation of the feces has so benefited the disease, as to render it amendable to operation when before it was not so considered. Nevertheless, the feelings of the patients after a colostomy are by no means universally good; a prolapse of the bowel, or the frequent appearance of fecal masses, are very unpleasant sequels. At its best the operation of colostomy is not a perfect one.

When there is time for this procedure it is best to fix the sigmoid in the abdominal wall, and to open it with a thermocautery from two to six days later.

SOCIETY PROCEEDINGS.

AMERICAN PUBLIC HEALTH ASSOCIATION.

Twenty-fifth Annual Meeting, Held at Philadelphia, October 26, 27, 28, and 29, 1897.

(Continued.)

THIRD DAY—OCTOBER 28TH.

MORNING SESSION.

DR. E. A. DE SCHWEINITZ of Philadelphia was appointed a delegate to represent the Association at the Congress for the Study of Tuberculosis which meets at Paris during 1899.

DR. HOWARD S. ANDERS introduced a series of resolutions in which certain churches were commended for having adopted the use of individual communion cups to prevent the spread of disease, and "recommending to the public the general use of individual cups, particularly in schools, on railway trains, in stations, at public fountains, and the like, as contributory to the better preservation of the public health and the prevention of communicable disease." The matter was referred to a committee.

The Committee on Health Legislation presented a report containing a draft of a bill, very broad in its scope, to create a Department of Public Health at Washington.

RECENT RESEARCHES RELATING TO THE ETIOLOGY AND SPECIFIC TREATMENT OF YELLOW FEVER

was the title of a paper read by SURGEON-GENERAL GEORGE M. STERNBERG, U. S. A. (See page 613.)

DR. M. P. RAVENEL of Philadelphia then read a paper, entitled

TUBERCULOSIS AND MILK-SUPPLY,

in which reference was made to the fact that about one-seventh of all deaths are caused by tuberculosis, and the statement was made that in the vast majority of cases man contracts the disease through his food, particularly though milk which contains tuberculous matter. As a remedy, the author advocated the careful inspection of milch cows and the condemnation of all diseased animals, such inspection being made at frequent intervals in order that the presence of the disease may be discovered before it has made much progress. He also advised the sterilization by boiling of milk from suspected cows, and said that under no circumstances should it be given to invalids or children.

THE SANITATION OF CARS.

A paper on this subject by DR. GRANVILLE P. CONN, President of the State Board of Health of New Hampshire, was read by DR. SCHWARTZ. It contained portions of a report of a commissioner on the subject of car-sanitation, which seemed to show that not much is to be complained of on this score. It was said that the present means of ventilating railway carriages and keeping them in a sanitary condition would be better adapted to the necessities of the case, if employees were compelled to carry out the rules and regulations adopted by the railroad companies.

DR. JOHN N. HURTY, Secretary of the State Board of Health of Indiana, said that credit for the adoption of the rules and regulations referred to is due the "Big Four" Railroad Company, which was the first to take action in the matter. On this road the cars are cleaned and ventilated at the end of each hundred-mile trip, the cushions and draperies being taken out, aired and dusted, and the woodwork washed; moreover, every car is fumigated once a month. The speaker said that other Western roads talk of adopting similar regulations, and that the subject was recently discussed at a meeting of division superintendents of the Pennsylvania Railroad.

DR. JAMES of Baltimore remarked that some form of automatic ventilation should be provided in cars, and that the windows should not be used for this purpose, as passengers themselves often make proper ventilation impossible by closing windows which ought to be kept open.

AFTERNOON SESSION.

URGENT NEED OF SANATORIA FOR THE CONSUMPTIVE POOR OF LARGE CITIES

was the title of a paper read by DR. S. A. KNOPF of New York.

The author dwelt upon the importance of the establishment of sanatoria for the reception of the thousands of tuberculous patients of the tenement-house districts of large cities, who unconsciously disseminate the germs of the disease among their relatives, friends, and neighbors, or who fill the wards of the general hospitals to the detriment and danger of the other patients. He stated that a consumptive expectorates during twenty-four hours as many as seven billions of bacilli, which, if not properly disposed of, contaminate others. The sputum containing the bacilli becomes dry and pulverized, and is inhaled in the form of dust. The vigorous and healthy are not so apt to become infected as are the weak and ill-nourished and the very young.

Reference was made to the Adirondack Cottage Sanitarium in New York State and the Chestnut Hill Hospital for the Consumptive Poor near Philadelphia, where excellent results have been obtained in spite of the fact that at the latter institution very advanced cases are received. The author called attention to the fact that in the villages of Goerbersdorf and Falkenstein, where two of the largest German sanatoria are situated, the mortality from tuberculosis has actually decreased among the inhabitants, being now one-third less than it was before the establishment of the institutions. This can be considered as proof positive that a well-conducted sanatorium for consumptives is not a center of infection. He also expressed his belief that these institutions serve as hygienic educators of the people, in that the inmates set a good example as to the proper mode of life for consumptives to lead.

DR. L. F. FLICK of Philadelphia strongly urged the establishment of hospitals for consumptives, in order that the latter might be removed from the home circle. He said that during the last ten years efforts have been made to educate the people of Philadelphia in regard to tuberculosis by the distribution of literature, and that during this period the mortality of this disease has decreased twenty-five per cent., and he expressed the opinion that if this education can be further extended, the disease will be practically stamped out within twenty-five years.

DR. LYDIA RABINOWITCH of Philadelphia then read a paper on

MICROBES IN BUTTER AND MILK,

in which she gave the results of bacteriologic examinations of various samples of butter and milk. In none of her experiments was the tubercle bacillus discovered.

DR. E. T. STEWART of East Orange, N. J., read a paper, entitled

THE PURIFICATION OF WATER AND DISPOSAL OF SEWAGE,

in which he described in detail the working of several of the large sewage-disposal plants of European cities.

INVESTIGATIONS OF WATER-SUPPLY BY THE UNITED STATES GEOLOGICAL SURVEY.

This report was read by MR. F. H. NEWELL, hydrographer of the United States Geological Survey. It discussed from a geologic or engineering point of view the question of municipal water-supply and stream-pollution, and described the work accomplished by the Division of Hydrography in bringing together facts concerning the daily flow of typical streams in various parts of the United States, showing how the quantity varies from day to day, the results and duration of floods and of low water, and other details connected with the behavior of streams.

FROM SEWAGE TO DRINKING-WATER; A STUDY OF THE NATURAL PROCESSES OF SEWAGE-PURIFICATION AND THE MEANS WHEREBY THEIR EFFICIENCY MAY BE INCREASED

was the title of a paper read by COLONEL GEORGE E. WARING, Commissioner of the Department of Street

Cleaning of the city of New York. The speaker stated that the paper was written by his secretary, Mr. George Everett Hill, and that he presumed to read it because it fully set forth his own ideas, and because of the fact that it would never have been written had not its author been his secretary for many years.

The paper treated the subject in a most exhaustive manner. The fact was made clear that no matter what the process of sewage-disposal may be, sooner or later all the products of life-processes are subjected to the action of reducing agents, and are sent back to the storehouse from which they were originally drawn.

The discharge of sewage into the sea or into the strong, sweeping current of a great river (not used as a water-supply) was advocated wherever circumstances make it possible, as the simplest and least expensive method of disposal. In the case of the majority of inland towns, where such a plan is not feasible, the question of the disposal of sewage becomes a grave problem, and under such circumstances a solution is to be found in the processes of biologic combustion. By furnishing conditions favorable to the rapid action of the natural purifying agents, the sewage of the largest city may be freed from all impurities, and the water which has been used and soiled may be passed on in a condition of purity fitting it for further use.

A description was then given of a sewage-disposal plant situated near Philadelphia, in which purification of sewage is accomplished by a process of screening, in which the material is finely divided, and filtering.

FOURTH DAY—OCTOBER 29TH.

MORNING SESSION.

The result of the election of officers for the coming year was as follows: President, Dr. Charles A. Linsley, New Haven, Conn.; first vice-president, Dr. Benjamin Lee, Philadelphia, Pa.; second vice-president, Dr. John C. Shrader, Iowa City, Iowa; secretary, Dr. Henry C. Probst, Columbus, Ohio; treasurer, Dr. Henry C. Bolton, Brattleborough, Vt.

The following committee was appointed to investigate yellow fever: Drs. H. B. Horlbeck, Charleston; T. H. Durgin, Boston, Mass.; A. H. Doty, New York; G. M. Sternberg, U. S. A., Washington; T. R. Oliphant, New Orleans; R. H. Swearinger, Austin, Tex., and Mr. Isaac H. Hartzell, Canton, Ohio.

Ottawa, Canada, was decided upon as the next place of meeting.

The report of the committee on "Disposal of Garbage and Refuse" was then read. It stated that, as it was inexpedient to make original researches, the work of the committee had been confined to the collection of statistics and the inspection of plants.

In the discussion which followed, the cremation of garbage was advocated by the majority of the speakers.

The report of the committee on the "Tranportation and Disposal of the Dead" was read by DR. CHARLES O. PROBST, secretary of the Ohio State Board of Health.

The report of the committee to "Examine into the Existing Sanitary Municipal Organizations of the Countries Belonging to the Association" was then read by DR. HENRY MITCHELL, secretary of the New Jersey State Board of Health.

AFTERNOON SESSION.

DR. S. P. HEILMAN, of the State Board of Health of Pennsylvania, read a paper, entitled

UNIFORM AND CO-OPERATIVE HEALTH LAWS,

which was followed by one on

A UNIFORM SANITARY LAW,

by DR. M. E. WORDIN, of the State Board of Health of Connecticut, in which it was pointed out that the same necessity exists for uniformity in health and sanitary legislation as in criminal law.

A resolution in regard to the establishment of hospitals for consumptives was referred to a special committee.

In regard to the subject of a National Board of Health, the Association adopted a resolution supporting the bill offered by DR. ALBERT H. GIHON.

A paper, entitled

THE PRESENT MORTALITY-RATE IN DIPHTHERIA,

was read by DR. T. NEWTON SNIVELY of Philadelphia, and will appear in a later issue of THE MEDICAL NEWS.

The meeting was then declared adjourned.

REVIEWS.

"BAKTERIOLOGIE DES WEIBLICHEN GENITALKANALES." Menge & Kronig, 2 Bde., Verlagsbuchhandlung, Arthur Georgi, Leipsig, 1897. (Vol. I. by Menge; Vol. II. by Kronig, and the preface by Zweifel.)

THE first volume is devoted to the bacteriology of the genital tract of the non-puerperal woman, and presents the most recent views of bacteriologic science in this field. The author adhers to the opinion that while the region of the vulva is frequently inhabited by virulent germs, the vagina is usually free from them. The normal vaginal secretion, which has a slightly acid reaction, exercises a bactericidal influence against all germs which grow upon alkalin agar plates, and also against all facultative aerobic infectious germs. This is most powerful in the vagina of children, intact virgins, and in pregnant women—less so in the sexually developed, non-pregnant woman. The vagina of non-pregnant women must, therefore, be made as aseptic as possible before any operation is undertaken. Ordinarily the canal of the cervix uteri is not only free from germs, but prevents the entrance into the uterine cavity of all bacteria except the gonococcus. The cervical mucus has bactericidal qualities, but bacterial growth may occur in the uterine cavity if there is a dead nutritive field in the mucous membrane, or after the protective power of the cervix is destroyed by pathologic processes. The normal tubes are always free from germs. As a rule the contents and walls of pus-tubes are free from germs, but in twenty-five per cent. of the cases the etiologic factor is the gonococcus, and in ten per cent., the tubercle bacillus. Far more rarely the streptococcus pyogenes, and occa-

sionally the staphylococcus and anaerobic infectious germs are found. Healthy ovaries are to be considered germ-free. In bacterial diseases of the peritoneum occurring spontaneously, and not due to severe puerperal infection, the intestinal bacteria, the gonococci, and tubercle bacilli, act as etiologic factors.

In the second volume, Kronig treats of the pregnant woman, the woman in labor, and the puerperal woman, and comes to the following conclusions: The vaginal secretion is always of acid reaction. It possesses a bactericidal power toward all bacteria which grow on alkalin agar plates. According to Doderlein, the distinction between the normal and pathologic vaginal secretion of the pregnant woman is of no significance in reference to the puerpery. The vaginal douche removes mechanically and destroys chemically the bactericidal power of the vaginal secretion. In the vagina of the puerperal woman the following pyogenic germs live: staphylococcus pyogenes aureus, streptococcus pyogenes, and the bacillus coli communis. Laboratory experiments show that the vaginal secretion loses its bactericidal power during the first few days of the puerpery, but regains it after the first week. A functional fever caused by increased muscular work during labor does not exist. Every rise of temperature in a woman in labor points to a pathologic process in the organism. The amniotic fluid of the healthy woman is sterile. The amniotic fluid was found to contain germs in twenty-one women who had fever during labor. Under normal conditions the puerperal uterus is free from germs. The placental attachment is usually the place of infection in puerperal fever. The streptococcus is the most important infectious germ found in the uterus. The gonococcus was found thirty-one times in 296 women suffering from puerperal fever.

THE MENOPAUSE; A CONSIDERATION OF THE PHENOMENA WHICH OCCUR IN WOMEN AT THE CLOSE OF THE CHILD-BEARING PERIOD, WITH A PARTICULAR CONSIDERATION OF THE PREMATURE, ESPECIALLY THE ARTIFICIAL, MENOPAUSE. By ANDREW F. CURRIER, A.B., M.D. New York: D. Appleton & Co., 1897.

THIS is a sensible, honest book. Through it the author has made a contribution to medical literature of more than ordinary value. This conclusion is reached not because of the great intrinsic value of the facts adduced, but because every page bears the ear-marks of conscientious research. If Dr. Currier has not given us more scientific knowledge than we possessed before, it is, we are convinced, because such knowledge is unavailable.

Beginning with the history relating to the menopause, the author considers next the gross anatomic changes associated with the menopause. He then discusses the factors which influence the advent and progress of the climacterium, going thoroughly into considerations of disease, age, temperament, environment, and occupation. The phenomena of the normal and pathologic menopause are dealt with in the succeeding chapter. The premature menopause is next discussed, the author laying special stress upon the surgical climacteric. A chapter on treatment closes this interesting work. Without wishing to criticize, the reviewer would like to suggest that in the cases of obese women who have an early menopause, the use of the thyroid extract has proven efficacious in his hands, not only in reducing the obesity, but, as this process advanced, in inducing a return of the menstrual flow. Dr. Currier does not mention this method of treatment for this particular class of cases.

We do not like the numerous subheadings, as they break up the printed page too much and interrupt the reader's attention. Otherwise the book is typographically handsome.

THERAPEUTIC HINTS.

For Gonorrhœa the Following Is Recommended:

℞ Ol. gaultheriæ . . . . . gr. xv
Bismuthi subnit. . . . . ʒ v
Vaselini liq. . . . . ʒ iii.

M. Sig. Inject into the urethra three times daily, after urination, and retain as long as possible.

—*Duquaires.*

For the Puritus of Urticaria the Following Mixture Is Recommended:

℞ Chloralis hydratis . . . . . ʒi ℈i
Cocain hydrochlor. . . . . ʒ iiss
Aq. laurocersi . . . . . ʒ ii
Aq. destillatæ . . . . . Oi.

M. Sig. For external use.

For Laryngismus Stridulus.—

℞ Pot. citrat. . . . . ʒi ℈i
Pulv. ipecac. . . . . ʒ iii
Tr. opii . . . . . gtt. xvi
Syr. simp. . . . . ʒ iii
Aq. dest. . . . . ʒ iv.

M. Sig. Teaspoonful every hour.

Postural Cure of Enuresis in Children.—During sleep the pelvis should be raised and supported so that it forms an angle of 130° to 140° with the vertebral column. In this way the sphincter of the bladder is relieved from constant irritation. The treatment should be continued three weeks.

For Tuberculous Cystitis.—Inject into the bladder thirty drops of a 1-5000 to 1-3000 solution of the following mixture: Corrosive sublimate, 2 to 4 parts; sodium chlorid, 5 parts; distilled water, 100 parts.

To Relieve the Pain of Herpes Zoster.—For this purpose salicylate of methyl should be well rubbed into the healthy skin surrounding the eruption, which latter should be protected from the air by a suitable dressing.

For Pertussis.—

℞ Tr. belladonnæ . . . . . ʒ ii
Tr. valerianæ } aa . . . . . ʒ i.
Tr. digitali }

M. Sig. For children under five years of age 5 to 10 drops should be daily administered, increasing within one week to from 30 to 60 drops daily, in divided doses.